KEENLEYSIDE-MURPHY PROJECT
SOCIOECONOMIC ASSESSMENT

Prepared for:
BC Hydro and Power
Authority

Prepared by:
DPA Consulting Limited
Vancouver, BC

June, 1982
Revised February, 1984

Canadian Cataloguing in Publication Data

Main entry under title:
Keenleyside-Murphy project socioeconomic assessment

Revision of: Socioeconomic study : Keenleyside Murphy Project.
Bibliography: p.
ISBN 0-7726-0074-0

1. Columbia River - Power utilization - Economic aspects - British Columbia - Kootenay Boundary. 2. Columbia River - Power utilization - Economic aspects - British Columbia - Central Kootenay. 3. Columbia River - Power utilization - Social aspects - British Columbia - Kootenay Boundary. 4. Columbia River - Power utilization - Social aspects - British Columbia - Central Kootenay. 5. Kootenay Boundary (B.C.) - Economic conditions. 6. Central Kootenay (B.C.) - Economic conditions. 7. Kootenay Boundary (B.C.) - Social conditions. 8. Central Kootenay (B.C.) - Social conditions. 9. Keenleyside Powerplant Project. 10. Murphy Creek Project. I. B.C. Hydro. II. DPA Consulting Limited.

HC117.B7S62 1984 333.91'4 C84-092140-3

B.C. HYDRO

This impact assessment is based on the "Keenleyside Powerplant Project Engineering Description" prepared in November 1982. Since that time, ongoing planning and design studies have resulted in some changes that would affect the project description. The principal changes are as follows:

- In-service date has changed from 1992 to 1994 and the optional in-service date of 1990 is no longer being considered.
- Installed capacity has changed from 210 MW to 180 MW with corresponding changes to powerhouse design.

The above changes have been incorporated in the report only where they would affect the results of the impact assessment.

B.C. HYDRO

This impact assessment is based on the "Murphy Creek Project Engineering Description" prepared in November 1982. Since that time, ongoing planning and design studies have resulted in some changes that would affect the project description. The principal changes are as follows:

- In-service date has changed from 1993 to 1995.
- Installed capacity has changed from 300 MW to 275 MW.
- Small changes to the design and locations of shoreline protective works.
- Daily reservoir level fluctuations limited to 2.0 m during March, April and May (previously March and April).

The above changes have been incorporated in the report only where they would affect the results of the impact assessment.

PREFACE

This report was based on in-service dates of 1992 for the Keenleyside Powerplant Project and 1993 for the Murphy Creek Project. The current (February, 1984) in-service dates are delayed two years for Keenleyside (1994) and Murphy (1995). Since these in-service dates are still subject to change, the in-service dates used in this report have not been revised. A change in in-service dates by one or two years will affect the timing of socioeconomic impacts but will probably have no serious influence on the type or magnitude of the impacts.

INDEX

Page

Preface
Summary i

1.0 **INTRODUCTION** 1-1
1.1 Study Background 1-1
1.2 Project Description 1-2
1.3 Study Objectives 1-3
1.4 Terms of Reference 1-3
1.5 Geographic Focus 1-3
1.6 Study Limitations 1-5

2.0 **METHOD** 2-1
2.1 Inventory of Present Conditions 2-1
2.2 Impact Assessment 2-5

3.0 **PRESENT SOCIOECONOMIC CONDITIONS** 3-1
3.1 Population 3-1
3.2 Economy 3-5
3.2.1 Agriculture 3-7
3.2.2 Forestry 3-7
3.2.3 Mining 3-12
3.2.4 Other Manufacturing 3-14
3.2.5 Travel Industry 3-14
3.2.6 Construction 3-14
3.2.7 Other Industry 3-15
3.2.8 Labour Force Activity in Study Region and Area 3-15
3.2.9 Personal Income 3-17
3.2.10 Concluding Comment 3-20

3.3 Housing and Physical Infrastructure 3-20
3.3.1 Transportation 3-20
3.3.2 Water Supply & Wastewater Systems 3-21
3.3.3 Housing 3-24

3.4 Municipal Administration and Finances 3-25

3.5 Local Services 3-33
3.5.1 Medical and Health Services 3-33
3.5.2 Social Services 3-40
3.5.3 Education 3-44
3.5.4 Police Protection, Legal and Court Services 3-46
3.5.5 Organized Recreation 3-49
3.5.6 Community Planning 3-51

3.6 Community Cohesion 3-53

INDEX continued

Page

4.0 OVERVIEW OF FUTURE SOCIOECONOMIC CONDITIONS 4-1

- 4.1 Population Projections 4-1
- 4.2 Economic and Income Growth and Distribution 4-9
  - 4.2.1 Agriculture 4-9
  - 4.2.2 Mining 4-9
  - 4.2.3 Forestry and Wood Products 4-9
  - 4.2.4 Primary Metals 4-14
  - 4.2.5 Other Manufacturing 4-14
  - 4.2.6 Travel Industry 4-15
  - 4.2.7 Construction 4-15
  - 4.2.8 Transportation, Utilities, Trade, and Service Sectors 4-17
  - 4.2.9 Personal Income 4-18

5.0 IMPACTS OF KEENLEYSIDE-MURPHY PROJECT 5-1

- 5.1 Population Impacts 5-1
  - 5.1.1 Project Labour Force 5-1
  - 5.1.2 Direct and Indirect Population Impacts 5-8
  - 5.1.3 Demographic Characteristics of In-Migrants 5-13
  - 5.1.4 Distribution of Population Increase 5-14
- 5.2 Impacts on the Study Area and Regional Economy 5-23
  - 5.2.1 Local Expenditures by Project Employees 5-24
  - 5.2.2 Local Expenditures on Supplies and Services 5-25
  - 5.2.3 Other Indirect Income Generation 5-25
  - 5.2.4 Induced Income Effect 5-27
  - 5.2.5 Distribution of Income Generated 5-28
  - 5.2.6 Employment Generation During Construction 5-28
  - 5.2.7 Summary of Economic Impacts 5-30
  - 5.2.8 Operating Phase Impacts 5-32
  - 5.2.9 Impacts of Other Major Projects 5-33
- 5.3 Housing and Infrastructure Impacts 5-35
  - 5.3.1 Transportation 5-35
  - 5.3.2 Water and Wastewater Systems 5-35
  - 5.3.3 Housing 5-36
  - 5.3.4 Other Facilities and Businesses 5-37
- 5.4 Impacts on Local Government Finance 5-37

INDEX continued

Page

5.5 Community Service Impacts 5-39
5.5.1 Medical and Health Services 5-40
5.5.2 Social Services 5-41
5.5.3 Education 5-42
5.5.4 Police Protection, Legal, and Court Services 5-43
5.5.5 Organized Recreation 5-43
5.5.6 Community Planning 5-44

5.6 Social Impacts 5-44
5.6.1 Introduction 5-44
5.6.2 Public Attitude 5-45
5.6.3 Potential Social Impacts 5-48

6.0 MITIGATION, COMPENSATION, AND ENHANCEMENT 6-1

Appendix A: Bibliography
Appendix B: Terms of Reference
Appendix C: Study Contacts
Appendix D: Economic and Demographic Analysis: Supplementary Notes on Methodology
Appendix E: BC Hydro Murphy Creek Land Acquisition Policy
Appendix F: Sampling Methods

LIST OF TABLES

		Page
Table 3-1	Population: West Kootenay Region 1951-1981	3-2
Table 3-2	Population Distribution, Castlegar/ Trail Area	3-3
Table 3-3	Area Population Growth and Distribution	3-4
Table 3-4	Population Age Distribution: Castlegar/Trail Area, 1981	3-6
Table 3-5	Average Household Size and Number of Households	3-6
Table 3-6	West Kootenay Region: Employed Labour Force by Industry, 1971 & 1981	3-8
Table 3-7	Castlegar/Trail Area: Employed Labour Force by Industry, 1981	3-9
Table 3-8	West Kootenay Region: Industrial Sector Production and Payroll, 1980	3-10
Table 3-9	Castlegar/Trail Area: Industrial Sectors Production and Payroll, 1980	3-11
Table 3-10	Labour Force Activity in Study Region and Area: 1971-1981	3-16
Table 3-11	Average Personal Income from Tax Returns: West Kootenay Region	3-18
Table 3-12	Average Personal Income from Tax Returns, Various Localities 1977-1979	3-19
Table 3-13	Water Supply and Wastewater Systems in the Castlegar/Trail Study Area	3-22
Table 3-14	Local Government Revenue: West Kootenay Region, 1981	3-27
Table 3-15	Municipal Revenue: Castlegar/Trail Area, 1981	3-28
Table 3-16	Municipal Expenditure: Castlegar/ Trail Area, 1981	3-29
Table 3-17	Per Capita Local Government Revenue: Castlegar/Trail Area	3-30
Table 3-18	Per Capita Local Exenditure: Castlegar/Trail Area	3-31
Table 3-19	Municipal Tax Rates, 1981	3-32
Table 3-20	Total and Per Capita Taxable Assessment: 1980 and 1981	3-32
Table 3-21	Rated Hospital Bed Capacity per 10,000 Population, March 1981	3-35
Table 3-22	Number of Directory Active Physicians per 10,000 Population, September 1981	3-36
Table 3-23	West Kootenay Health Unit Staff, April 1981	3-36
Table 3-24	Number of Licensed Dentists per 10,000 Population, Specialists and Non-Specialists, September 1981	3-38
Table 3-25	Ministry of Human Resources Staff, April 1981	3-40

LIST OF TABLES continued

		Page
Table 3-26	School District No. 11, Trail, Enrollment 1961-81	3-45
Table 3-27	School District No. 9, Castlegar, Enrollment 1969-81	3-46
Table 3-28	Crime Trend Comparisons for Selected Communities in British Columbia	3-48
Table 3-29	Type of Dwelling for Households Interviewed	3-54
Table 3-30	Age and Sex Distribution of Residents in Households Surveyed	3-55
Table 3-31	Satisfaction with Services, Physical Environment, and Social Environment	3-55
Table 3-32	Comparison of Area Rating by Residents in Four BC Towns with Castlegar/Trail Neighbourhood Ratings	3-57
Table 3-33	Length of Residency in the Area, Length of Residency on Present Property, and Planned Residency	3-59
Table 4-1	Employment and Population Relationships Castlegar/Trail Area, 1981-2001 Without the Project	4-2
Table 4-2	Historical & Projected Population Structure: Castlegar/Trail Area, 1981-2001	4-4
Table 4-3	Historical & Projected Population Distribution Castlegar/Trail Area 1981-2001	4-7
Table 4-4	Without the Project Historical & Projected Number of Households, 1981-2001	4-8
Table 4-5	Historical and Projected Employment by Industry, Castlegar/Trail Area Without Keenleyside-Murphy Project	4-10
Table 4-6	Historical & Projected Value of Production by Industrial Sector, Castlegar/Trail Area Without Keenleyside-Murphy Project	4-11
Table 4-7	Historical & Projected Personal Income: Castlegar/Trail Area Without the Keenleyside-Murphy Project, 1981-2001	4-12
Table 5-1	Keenleyside-Murphy Project Construction Labour Force Estimates	5-2
Table 5-2	Estimated Resident Labour Force Available to Keenleyside-Murphy Project	5-4
Table 5-3	Projected Distribution of Work Force Between Resident and Non-Resident Workers: Keenleyside-Murphy Project	5-6

LIST OF TABLES continued

		Page
Table 5-4	Projected Distribution of Work Force Between Resident and Non-Resident Workers: Murphy Creek and Keenleyside Powerplant as Separate Projects	5-7
Table 5-5	Distribution of In-Migrant Workers Between Permanent Residents and Camp Residents	5-10
Table 5-6	Population Projections for the Study Area: Without and With the Project	5-12
Table 5-7	Distribution of Permanent Residents Keenleyside Murphy Project	5-15
Table 5-8	Population Impact (Permanent Residents Only) of Keenleyside-Murphy Project Distributed Between the Two Projects	5-16
Table 5-9	Estimated Number of Residences on Improved Residential Properties Affected by the Murphy Creek Project (With Proposed TOE Protection Installed	5-17
Table 5-10	Estimated Number of Residences on Improved Residential Properties Affected by the Murphy Creek Project (With Mandatory Protection Installed)	5-17
Table 5-11	Estimated Effects of Murphy Creek Project on Housing Units and Residents	5-18
Table 5-12	Distribution of Response, Survey Group 1 (Potentially Relocated Residents): First Choice of Where to Move (Percent of Response)	5-19
Table 5-13	Projected Impacts of the Keenleyside-Murphy on Population Distribution of Castlegar/Trail Area: 1981-1996	5-21
Table 5-14	Estimated Distribution of Construction Camp Population for Keenleyside Powerplant Project and Murphy Creek Projects	5-22
Table 5-15	Keenleyside-Murphy Project Local Expenditures	5-24
Table 5-16	Impact of Keenleyside-Murphy Project on Personal Income Accruing to Castlegar/Trail Area	5-26
Table 5-17	Employment Impact of the Keenleyside-Murphy Project	5-29
Table 5-18	Impacts of the Keenleyside-Murphy Project Construction on Employment and Income in the Study Area	5-31
Table 5-19	Impact of the Kennleyside-Murphy Project on the Castlegar/Trail Area Population	5-40
Table 5-20	School Age Children of In-Migrants, School Districts #9 and #11: Keenleyside-Murphy Project	5-43

SUMMARY

Introduction

The Keenleyside-Murphy Project Socioeconomic Impact Study examines the potential socioeconomic impacts of the Keenleyside Powerplant Project combined with the Murphy Creek Project at the El. 424 metre reservoir level. The project consists of the installation of hydroelectric generation facilities at the Hugh Keenleyside dam near Castlegar, and the construction of a dam with generation facilities at Murphy Creek near Trail. The present report utilizes inventory information originally collected in the spring of 1981 as part of the Murphy Creek impact study as well as updated information obtained in the spring of 1982 specifically for the Keenleyside-Murphy study. The Keenleyside-Murphy study was first submitted to BC Hydro in June, 1982. The June 1982 report analyzed the impacts of the Keenleyside-Murphy Project on the basis of preliminary project labour force estimates prepared by BC Hydro in May, 1982. The report was subsequently revised to reflect BC Hydro changes in the project labour force requirements and in the potential impacts of the reservoir on private properties.

The study region, labelled the West Kootenay Region, consists of the Regional District of Kootenay Boundary plus the Regional District of Central Kootenay. The study area, labelled the Castlegar/Trail area, consists of School District #9 (Castlegar) and School District #11 (Trail).

The study objectives are:

(1) to identify potential socioeconomic impacts resulting from the Keenleyside-Murphy Project,including transmission employment;

(2) to identify project-related public concerns and issues; and

(3) to suggest potential mitigation measures with respect to socioeconomic impacts.

The study approach involved preparation of an inventory of social and economic conditions in the study area and study region. Projections were then made of socioeconomic conditions that would occur in the absence of the project and these were compared with predicted conditions if the Keenleyside-Murphy Project proceeds.

Present Socioeconomic Conditions

The economy of the study region is resource-based and quite diversified, depending mainly on mining and related processing industries, forestry, agriculture, and tourism. The regional economy experienced a significant slowdown in activity in the 1981-1982 period.

Cominco is the single largest employer in the West Kootenays, accounting for almost a third of the total employment in the study area. The second largest employer is the BC Timber Ltd. pulpmill and sawmill operation. The work force at BC Timber Ltd. was reduced in 1982 and there will be reductions at Cominco as its expansion program is completed. This economic slowdown is reflected in the rental housing vacancy rates which have increased from essentially no vacancies in the spring of 1981 to over 10% as of the spring of 1982.

The economic performance of the study region and area does not compare favourably with economic trends in the province as a whole. Over the past decade, growth in the study region and area has been significantly below the provincial norm with respect to population, employment, and per capita income. This below average performance largely reflects the slow growth displayed by the region's basic economic sectors. A secondary factor is the emergence of Cranbrook as the dominant service sector in the Kootenays, which has particularly dampened commercial expansion in the

Trail/Rossland area.

According to data obtained in 1981 and 1982, social and community services and facilities in the study area are generally adequate to meet the present demand, although, like the rest of BC, the area experienced cutbacks in Health and Education during 1982.

Future Socioeconomic Conditions

The future for the area without the project is based on sector by sector projections of anticipated economic activity. This analysis suggests probable employment in the area which is then used as a basis to project total population. That is, if there are more jobs, more people can be supported; if there are fewer jobs, net migration out of the region will occur.

Over a twenty year period, population is projected to increase at an average rate, compounded annually, of 0.6% per year, whereas the total province is expected to increase at 2.2% per annum over the same period. This slow increase reflects the limited job opportunities provided by the area's main economic activities and the higher employment growth anticipated in other parts of the province and Western Canada. Growth in the number of households in the study area will average 1.2% per annum, which is well below the 2% per year growth displayed between 1971 and 1981.

The projected population for the Castlegar/Trail area is:

1986	37,100
1991	38,500
1996	38,800
2001	39,700.

The distribution will be approximately the same as at present (Trail area 65%, Castlegar area 35%), but with a slightly greater share in the Castlegar area. The average growth in total employment income and total personal income is expected to expand in line with the provincial average over the full twenty year projection period. Personal income per capita will continue to be 7-10 percentage points below the provincial average over the next two decades.

Keenleyside-Murphy Project Impacts

Construction of the Keenleyside Powerplant Project is scheduled to begin in late 1986 and be completed by August 1993. Murphy Creek Dam construction would commence in the spring of 1988 and finish in the fall of 1994. If the two projects proceed together, workers would have the opportunity to move from one project to another. In total, the Keenleyside-Murphy Project would create about 5,500 person-years of employment. Local employment on the project would be fairly high (65%) due to projected high unemployment rates in the study area and among local union members now working outside the area. If Keenleyside proceeds alone, the local share of employment would be higher (87%), reflecting its smaller construction labour force, but person-years of employment would be less.

The in-migrant labour force would have a small population impact on the Castlegar/Trail area. While most (75%) of the supervisory and owner's staff would bring their families and take up residence, other occupational categories would be more likely to reside in construction camps because, typically, they would only be needed for a year or less. During the peak year of construction, 1991, there would be an additional 235 permanent residents in the Castlegar/Trail area and an average of 557 in the construction camps with a peak construction-camps population of 820. If Keenleyside proceeds alone, the average population increase during the peak year, 1991, would be 79 permanent residents and 65 in the construction camp.

Overall, the project would have a positive, but very small impact on the population of the study area. The project results in a more rapid population growth through the late 1980s to a peak of nearly 39,300 in 1991. This will slowly decline to 38,700 in 1995. Particularly noteworthy is the very slight impact of the Keenleyside Powerplant Project if it proceeds on its own. Corresponding to the project's small population impact, the effects on municipal infrastructure and community services would also be small.

Expenditures on the Keenleyside-Murphy project within the Castlegar/Trail area would initiate a cycle of spending resulting in additional jobs and incomes for local residents and businesses, in-migrant workers, and individuals and firms outside the study area. When the direct, supplier-related and respending effects are combined, the project would add more than 1,500 jobs to the study area economy in the peak construction year, 1991-1992. This represents a 5.5% increase compared with the without the project projections. The unemployment rate in the peak construction years (1989-1993) would decrease from an average of 12% to an average of 7% as a consequence of the project. Over the total (1986-1995) construction period, over $141 million (1980 $) would be added to the personal incomes of the permanent residents of the Castlegar/Trail area. In the peak construction year, the relative impact on total personal income would also be about 7%. The relative impact on personal income per capita would be somewhat lower, but still highly significant. Throughout the 1989-1994 period, per capita income in the study area would be from 3% to 5% closer to the provincial average as a consequence of the project. In general, the project would have a favourable effect on the study area's economy and would help offset the effects of the employment reduction at Cominco.

In the operating phase, the Keenleyside-Murphy Project is expected to employ a total of 24 employees at the two sites. Additional employment of 30 to 40 people for a six week period would result from annual maintenance. Respending of income would generate up to 6 additional jobs in the service sector. The annual increment to the personal income of the study area's permanent residents would be approximately $900,000. This represents less than 0.2% of aggregate personal income projected for the area.

Since the impacts on population would be small, the effects on housing and physical infrastructure would be similarly limited. An estimated 200 households would be affected by the Murphy Creek Project if no mitigation works were constructed. Construction of toe protection and other mitigation measures would reduce this impact to 136 households, of which at least 89 households (or 250 residents) would have to permanently relocate. The remainder would require modifications to their property and/or residences, or would be acquired. Some of these residents may need to temporarily move out during construction activities on their properties. A relatively small number of in-migrant workers are expected to require permanent accommodation in the study area (no more than 100 even in the peak construction year). Since the vacancy rate for rental accommodation in the area is expected to be high throughout the projection period, and since the area's housing construction sector is expected to be operating at below capacity without the project, it is concluded that permanent in-migrants and relocatees will be readily accommodated either in existing housing stock or in new houses which could be constructed without straining the area's residential construction capacity.

The effects on local government finance would be quite subtle and have not been precisely quantified in this report. Regardless, the impacts would be small and are expected to be distributed among a number of municipalities. This situation could change and requires ongoing monitoring.

Considering the minimal population impacts of the Keenleyside-Murphy Project and assuming that 1981-1982 levels of service are maintained, the project would not create any significant increase in the need for community services. If the Keenleyside Powerplant Project were to proceed without Murphy Creek, its impact on community services would be similarly small.

Some increased demand for services would be caused by the residents of the two construction camps during the years 1989 through 1993. In particular, they would use hospital emergency services; they would make extensive use of the recreation facilities and services; and they would place increased demands on the RCMP. The permanent inmigrants would add a small number of school children (up to 70) to the Castlegar and Trail School Districts. Each School District could require the addition of one classroom and one or two teachers.

The most important negative social impacts of the Keenleyside-Murphy Creek project would be:

- uncertainty, anxiety, disruption, and loss of a valued home for people who would have to permanently relocate;
- disruption to the residents of Rivervale and Oasis as a result of construction activity (for example, noise, dust, vibration and increased traffic) and the presence of the construction camp nearby;
- disturbance and inconvenience to residents temporarily displaced during construction activities on their properties; and
- loss of up to 30% of the population of Genelle which could severely change the fabric of the whole community.

The social impacts of the Keenleyside Powerplant Project without the Murphy Creek Project are expected to be mostly positive. This situation reflects the following factors:

- the project would create much needed jobs and income for local residents;
- the relatively small number of in-migrant workers and their dependents means that local services would not be overburdened;

- the relatively small number of construction camp residents and the fact that many would likely be middle-aged people suggests that social disruption would be limited;
- no long-term environmental impacts from Keenleyside have been indentified; and
- local attitudes to the Keenleyside Powerplant Project are positive.

The main concerns of local residents regarding the Keenleyside Powerplant Project are traffic congestion on Columbia Street and the Robson-Broadwater Road, and increased strain on recreation facilities. The only other social impact we foresee would be the disturbance from noise, dust, and vibration to residents who live near the Keenleyside construction site.

There is strong local support for the Keenleyside Powerplant Project and people want it to proceed as quickly as possible so the community can obtain the employment and income benefits. There is more ambivalence toward the Keenleyside-Murphy Project because of the potential environmental impacts of the Murphy Creek dam and the concern for residents who live along the river bank and will have to relocate.

1.0 INTRODUCTION

1.1 Study Background

The Keenleyside-Murphy Project Socioeconomic Impact Study is one of several studies required for the environmental impact evaluation of a potential BC Hydro project on the Columbia River. The project consists of the installation of hydroelectric generation facilities at the Hugh Keenleyside dam 7 km upstream from Castlegar, and the construction of a dam with generation facilities at Murphy Creek about 3 km upstream from Trail.

The Hugh Keenleyside dam was built in the late 1960's in accordance with the terms of the Columbia River Treaty. The dam was built as a storage dam in order to lessen downstream flood damage and to increase generation capacity in the United States.

The feasibility of building the Murphy Creek dam has been under study for several years. Detailed environmental and socioeconomic studies pertaining to Murphy Creek were undertaken in 1980. After the preliminary drafts of the Murphy Creek studies were completed, BC Hydro commissioned socioeconomic and environmental studies for the addition of generation facilities to the Hugh Keenleyside dam to be done in conjunction with the building of the Murphy Creek dam at the El. 424 metre normal reservoir operating level. The present report utilizes inventory information orginally collected in the spring of 1981 as part of the Murphy Creek impact study[1] as well as updated information obtained in the spring of 1982 specifically for the Keenleyside-Murphy study. The Keenleyside-Murphy study was first submitted to BC Hydro in June, 1982. The June '82 report analyzed the impacts of Keenleyside-Murphy on the basis of preliminary project labour force estimates prepared by BC Hydro in May, 1982. The present report is a revision of the June '82 report made necessary by BC Hydro's revision of the project labour force requirements in November, 1982; changes in potential impacts on private properties, February, 1984; and revised population projections based on 1981 census data.

It is most important to note that this report has been written over a four-year period. The first version assessed the potential socioeconomic impacts of the Murphy Creek Project at three different reservoir levels. The second version was limited to the Keenleyside Powerplant Project with some reference to the cumulative impacts of both projects. The current report uses information from both previous reports to assess the potential impacts of the combined projects. Thus, the reader will notice different data collection dates throughout the report ranging from 1978 to 1984. For example, the household survey and all personal interviews in the study region were carried out in 1981. Some, but not all, of these data were updated through telephone interviews in 1982. Information from BC Hydro regarding impacts on properties is dated 1984. An update of all data in this report and a review of the report findings should be dne immediately prior to a public hearing on the project, if a hearing takes place. it is not cost-effective to do anymore updating before this time because the nature and magnitude of the socioeconomic impacts are not expected to change significantly.

1.2 Project Description

The Keenleyside-Murphy Project consists of the Keenleyside Powerplant Project and the Murphy Creek Project. The proposed Keenleyside Powerplant Project would consist of generating facilities on the north bank, between the existing discharge facilities and the Robson-Broadwater Highway. The optimum installed capacity would be 210 MW with three 70 MW generating units.

The Murphy Creek Project site is located on the Columbia River 3 km upstream from the city of Trail and 23 km downstream from the confluence of the Columbia and Kootenay Rivers, near Castlegar. The tentative design for the project calls for the construction of an earth/rockfill dam in the river channel. The powerhouse would be located on the west bank and a five-bay spillway would be between the powerhouse and the dam. A total installed capacity of 300 MW would be provided by five 60 MW turbine generators.

According to BC Hydro Engineering Descriptions,[2,3] the preferred project schedule calls for construction on the Keenleyside Powerplant Project to begin in late 1986. The first unit would be in service in August, 1992, and construction would be completed in August, 1993. Construction on the Murphy Creek dam would begin in the spring of 1988; the first in-service date would be October, 1993; and construction would be completed in October, 1994. Except where noted, the present impact analysis is based on this preferred project schedule. Construction would be year-round with most of the work being done on a two-shift basis, five days per week.

1.3 Study Objectives

The objectives of the socioeconomic study are:

(1) to identify potential socioeconomic impacts resulting from the Keenleyside-Murphy Project, including transmission employment;

(2) to identify project-related public concerns and issues; and

(3) to suggest potential mitigation measures with respect to socioeconomic impacts.

1.4 Terms of Reference

The specific terms of reference for the Keenleyside-Murphy socioeconomic study are presented in Appendix B. In general, the study was defined to include:

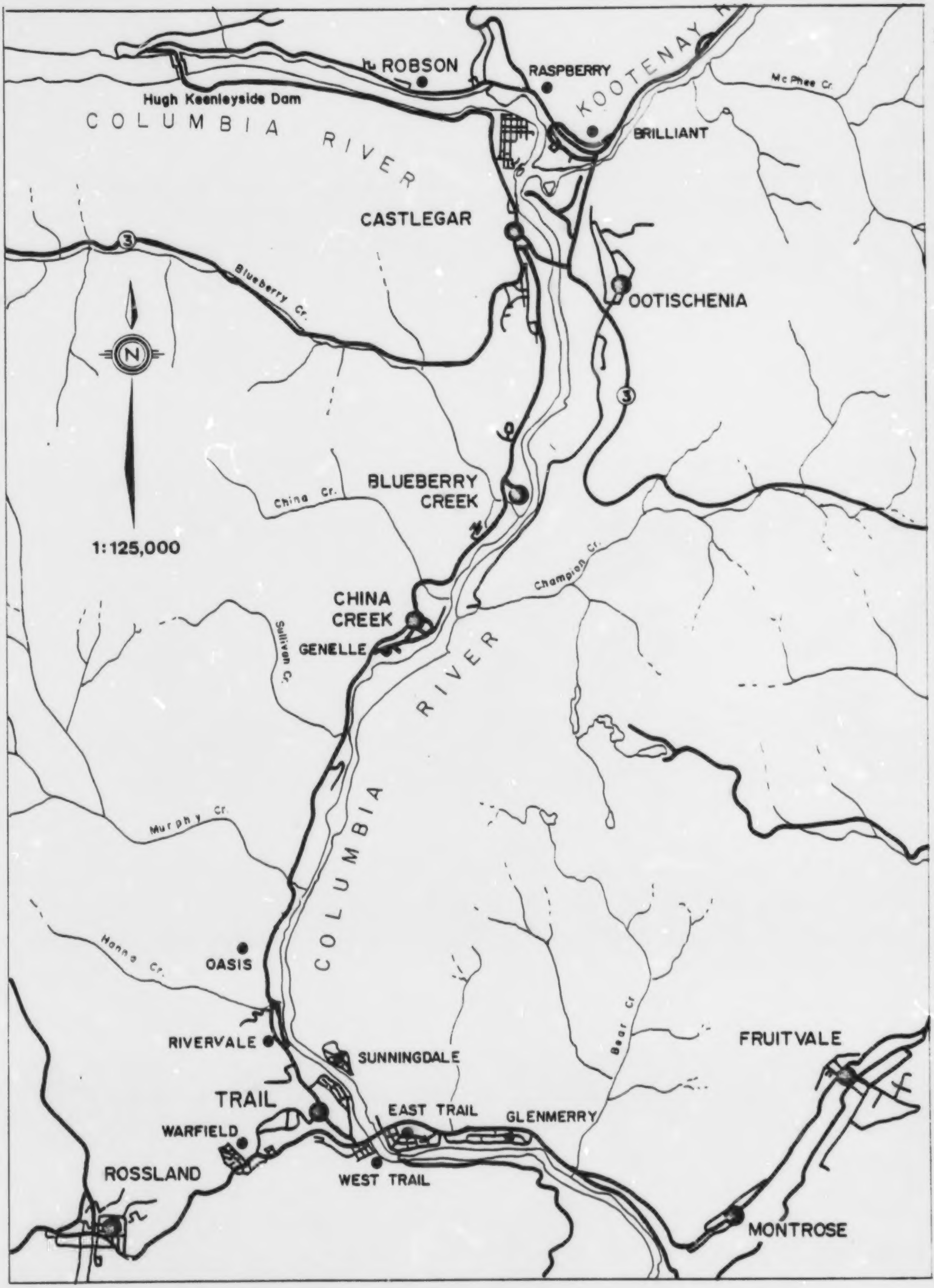
- a description of current social and economic conditions in the study area
- a projection of future socioeconomic conditions in the area without the Keenleyside-Murphy Project
- a description of the potential socioeconomic impacts of the Keenleyside-Murphy Project and suggested mitigation measures.

1.5 Geographic Focus

The study region has been defined as the Regional District of Kootenay Boundary and the Regional District of Central Kootenay. Throughout the report, this is referred to as the West Kootenay region.

The study area consists of School District #9, centered on Castlegar, and School District #11, centered on Trail-Rossland. This is called the Castlegar/Trail area throughout the text.

It should be noted that within the study area, impacts would tend to vary depending on the project and indicator being analyzed. The impacts of the Keenleyside Powerplant Project would be much greater in Castlegar and vicinity than in the rest of the study area. In the case of Murphy Creek, housing and labour force impacts are expected to be concentrated in the Trail-Rossland area, but Castlegar would be strongly affected by resident relocation and other factors. Differences between communities and sub-areas will be noted in the text.


ROBSON
RASPBERRY
KOOTENAY R.
Hugh Keenleyside Dam
McPhee Cr.
COLUMBIA RIVER
BRILLIANT
CASTLEGAR
3
Blueberry Cr.
OOTISCHENIA
N
3
BLUEBERRY CREEK
China Cr.
1:125,000
Champion Cr.
CHINA CREEK
Sullivan Cr.
GENELLE
RIVER
COLUMBIA
Murphy Cr.
Hanna Cr.
OASIS
Bear Cr.
FRUITVALE
RIVERVALE
SUNNINGDALE
TRAIL
EAST TRAIL
GLENMERRY
WARFIELD
WEST TRAIL
ROSSLAND
MONTROSE

SOCIOECONOMIC STUDY AREA

tend to vary depending on the project and indicator being analyzed. The impacts of the Keenleyside Powerplant Project would be much greater in Castlegar and vicinity than in the rest of the study area. In the case of Murphy Creek, housing and labour force impacts are expected to be concentrated in the Trail-Rossland area, but Castlegar would be strongly affected by resident relocation and other factors. Differences between communities and sub-areas will be noted in the text.

1.6 Study Limitations

Unlike most other study disciplines, the inventory of social and economic conditions can change dramatically in a short time period. Thus, data compiled during the spring of 1981 and the spring of 1982 will not necessarily be accurate at a later date. This is particularly true of local attitudes toward the project which are partly dependent on local economic conditions, project design, and the kind of information made available to the public. Thus, the study findings are subject to modification as local conditions change.

A second limitation is that the only socioeconomic impact resulting from the construction of the transmission lines associated with the project which has been considered is the employment impact.

A final, important limitation is the lack of detailed information on the non-wage project expenditures by category (for example, the expected expenditures for items such as lumber, cement, vehicles, equipment, etc.). This information is required to predict the amount of procurement from local suppliers and the subsequent effect on local value added. This analysis is necessary not only for predicting effects on the local area, but also for developing policies to maximize local purchases. Since local businesses are expected to be

1.6 Study Limitations

Unlike most other study disciplines, the inventory of social and economic conditions can change dramatically in a short time period. Thus, data compiled during the spring of 1981 and the spring of 1982 will not necessarily be accurate at a later date. This is particularly true of local attitudes toward the project which are partly dependent on local economic conditions, project design, and the kind of information made available to the public. Thus, the study findings are subject to modification as local conditions change.

A second limitation is that the only socioeconomic impact resulting from the construction of the transmission lines associated with the project which has been considered is the employment impact.

A final, important limitation is the lack of detailed information on the non-wage project expenditures by category (for example, the expected expenditures for items such as lumber, cement, vehicles, equipment, etc.). This information is required to predict the amount of procurement from local suppliers and the subsequent effect on local value added. This analysis is necessary not only for predicting effects on the local area, but also for developing policies to maximize local purchases. Since local businesses are expected to be working under-capacity, BC Hydro procurement policies will be very important to them.

The remainder of this report is organized into the following sections. Section 2.0 describes the method used to collect and analyse the data. Section 3.0 contains the inventory of present conditions. Section 4.0 presents an overview of likely socioeconomic conditions in the study area if the Keenleyside-Murphy project does not proceed. Section 5.0

contains the impact assessment, and Section 6.0 presents proposals for mitigation and compensation.

FOOTNOTES

1. DPA Consulting Limited, Murphy Creek Hydroelectric Development Socioeconomic Impact Assessment, October, 1981.
2. BC Hydro, Hydroelectric Generation Projects Division, Keenleyside Powerplant Project, Engineering Description, Report No. 1560, November 1982.
3. BC Hydro, Hydroelectric Generation Projects Division, Murphy Creek Project, Engineering Description, Report No. #1565, November 1982.

2.0 METHOD

2.1 Inventory of Present Conditions

The study began in January, 1981 with the compiling of information that was available from sources outside the study area such as the federal government, provincial government, professional groups, and BC Hydro to provide a comprehensive information base that would allow study area interviews to be directed toward the information gaps. Exhibit 2.1 gives a list of the sources contacted during the study. The bibliography (Appendix A) cites published material reviewed during the course of the study. Inventory information from published sources was updated in 1982 and again in 1984 with the incorporation of population, labour force, and income data from the 1981 census.

The second step was to contact municipal governments, regional districts, major employers, and local services to assess present conditions and the adequacy of existing services to meet present and predicted demands. Although almost all interviews were personal, the 1982 update was done mainly through telephone interviews. Appendix C lists the names of people who were interviewed.

Finally, we met with the Project Impact Committee and representatives of several community organizations. We also conducted personal interviews with 254 households in the study area.

The purposes of the household survey were:

1) to find out how people expected the project to affect the quality of their lives;
2) to assess key concerns regarding the possibility of relocation;
3) to identify, if possible, the characteristics of the people who would feel the effects of relocation more severely than others.

EXHIBIT 2.1: CONTACTS FOR SOCIOECONOMIC ANALYSIS

	Agency	Location(s)	Subject Matter
1.	**Federal**		
	Statistics Canada	Vancouver	Demographic & household data (population, age-sex distribution, migration patterns, settlement patterns, household size, household tenure.) Labour force (number, age-sex, industry, occupation, participation rate, unemployment.) Census of Agriculture (employment & production.) Census of Manufacturing (employment & production.) Income (wages & salaries.)
	Canada Employment Immigration Commission & District Statistician	Vancouver Trail Nelson	Unemployment by sector, rates, trends, effect of other major projects, bottlenecks, training.
	National Revenue	Vancouver	Incomes & trends
	DREE	Victoria	Previous regional studies, input-output modelling.
	RCMP	Trail Castlegar	Crime types and rates, staffing, provincial standards.
	CMHC	Vancouver	Vacancy rates, housing trends.
2.	**Provincial**		
	Health	Victoria	Provincial standards for doctors, dentists, public health nurses, ambulance and emergency services, cost sharing agreements.
	Highways	Victoria	Planned new highways and upgrading, ferry plans.

... continued

EXHIBIT 2.1: continued

	Agency	Location(s)	Subject Matter
	Industry & Small Business	Victoria	Other major projects, provincial priorities for regional economic development, project impacts.
	Central Statistics Bureau	Victoria	Population projections; special small area tabulations.
	Municipal Affairs	Victoria	Municipal finance.
	Attorney General	Vancouver	Amount and type of demand for services.
	Provincial Fire Marshall	Vancouver	Latest fire protection standards.
	Education	Victoria	Enrollment statistics.
	Human Resources	Trail Castlegar	Social problems, social assistance dependence.
	Tourism	Victoria	Tourist accommodation, expected demand.
	Labour	Victoria	Background studies.
3.	**Regional**		
	Kootenay-Boundary Regional District Central Kootenay Regional District	Trail Nelson	Regional plans, resource and economic base studies, demographic and economic projections.
4.	**Municipal and Local**		
	Municipal Government	Trail Castlegar	Building permits, number residential units, municipal finance, contribution of residential, commercial, industrial, community goals, attitude toward the project. Impacts of 7-Mile Project.
	School Districts #9 and #11	Trail Castlegar	Number of classrooms, teachers, and pupils. Problem areas.

... continued

EXHIBIT 2.1: continued

Agency	**Location(s)**	**Subject Matter**
Hospitals	Trail Castlegar Rossland	Capacity, current use, recruitment of medical personnel.
Public Health & Mental Health	Trail Castlegar	Staffing, capacity, problems.
Fire Chief	Trail Castlegar	Staffing, equipment, problems.
Ambulance Services	Trail Castlegar	Staffing, equipment, problems.
Major Employers	Trail Castlegar	Present employment, future plans.
Trade Unions	Trail Castlegar Vancouver	Local availability of trades, hiring policies.
Industrial Development Commission	Trail Castlegar	Future development possibilities.

The survey was directed toward two main groups: (1) people residing on property likely to be acquired by BC Hydro, and (2) other people living in study area communities. Peoples' attitudes and concerns about the project were expected to differ depending on whether they were likely to relocate. It was also important to interview both groups because BC Hydro did not know at that time exactly which households would need to move. If the survey were limited to potentially relocated households, it was feared that all those interviewed might wrongly assume they would have to move if the project proceeded.

At the time of the survey (April, 1981) BC Hydro Properties Division estimated that, with protective works, the number of houses affected would range from 60 to 265, plus 75 mobile homes, depending on the reservoir level; without protective works, the number of houses affected would be up to 500 households.[1] Therefore, the study population for Households Likely to be Relocated was 500 households. A random sample of 125 households was selected from this group, and 105 interviews were completed.

The number of Households Not Likely to be Relocated in the study area was estimated at 7,000. A sample of 180 households was selected, and 149 interviews were completed. (The sample selection rationale is elaborated in Appendix F.)

The survey was publicly announced in both local papers (see Exhibit 2.2). All interviews were conducted on a personal basis using a standard questionnaire, which is contained in Appendix G. Most households (83%) agreed to be interviewed.

2.2 Impact Assessment

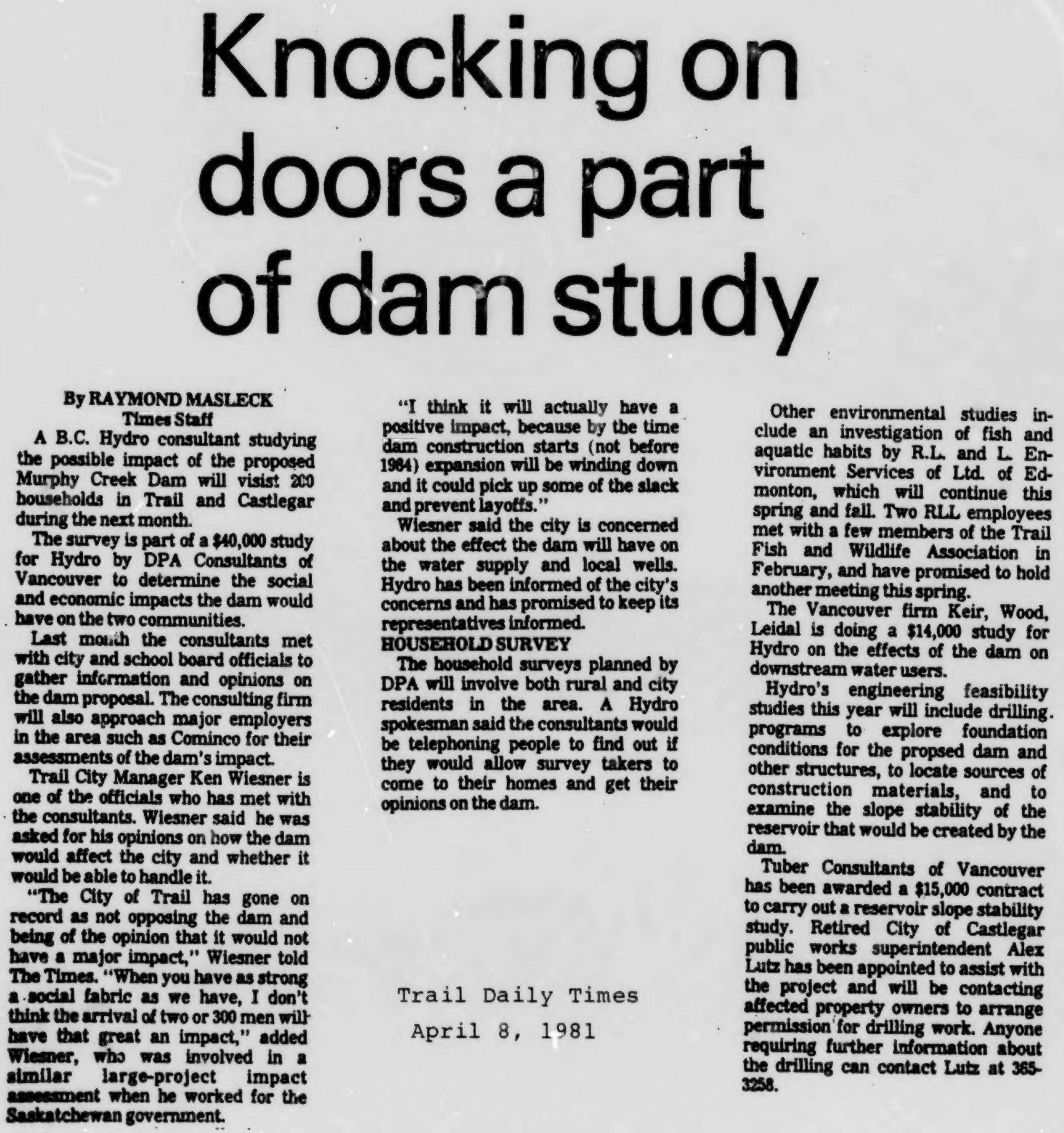
The general approach of the impact assessment was to compare future socioeconomic conditions that would occur in the absence of the project with projections of future socioeconomic conditions that would occur if the project were to proceed.

An outline of the method for predicting the quantitative impacts such as population, labour force and employment, income, housing, physical services, and municipal finance performance is illustrated in Exhibit 2.3. A detailed explanation of the methodology is presented in Appenidix D.

FOOTNOTES

[1] These figures have since been revised and are reported in Table 5.9.

EXHIBIT 2.2: NEWSPAPER ANNOUNCEMENTS OF HOUSEHOLD SURVEY



Knocking on doors a part of dam study

By RAYMOND MASLECK
Times Staff

A B.C. Hydro consultant studying the possible impact of the proposed Murphy Creek Dam will visist 200 households in Trail and Castlegar during the next month.

The survey is part of a $40,000 study for Hydro by DPA Consultants of Vancouver to determine the social and economic impacts the dam would have on the two communities.

Last month the consultants met with city and school board officials to gather information and opinions on the dam proposal. The consulting firm will also approach major employers in the area such as Cominco for their assessments of the dam's impact.

Trail City Manager Ken Wiesner is one of the officials who has met with the consultants. Wiesner said he was asked for his opinions on how the dam would affect the city and whether it would be able to handle it.

"The City of Trail has gone on record as not opposing the dam and being of the opinion that it would not have a major impact," Wiesner told The Times. "When you have as strong a social fabric as we have, I don't think the arrival of two or 300 men will have that great an impact," added Wiesner, who was involved in a similar large-project impact assessment when he worked for the Saskatchewan government.

"I think it will actually have a positive impact, because by the time dam construction starts (not before 1984) expansion will be winding down and it could pick up some of the slack and prevent layoffs."

Wiesner said the city is concerned about the effect the dam will have on the water supply and local wells. Hydro has been informed of the city's concerns and has promised to keep its representatives informed.

HOUSEHOLD SURVEY

The household surveys planned by DPA will involve both rural and city residents in the area. A Hydro spokesman said the consultants would be telephoning people to find out if they would allow survey takers to come to their homes and get their opinions on the dam.

Other environmental studies include an investigation of fish and aquatic habits by R.L. and L. Environment Services of Ltd. of Edmonton, which will continue this spring and fall. Two RLL employees met with a few members of the Trail Fish and Wildlife Association in February, and have promised to hold another meeting this spring.

The Vancouver firm Keir, Wood, Leidal is doing a $14,000 study for Hydro on the effects of the dam on downstream water users.

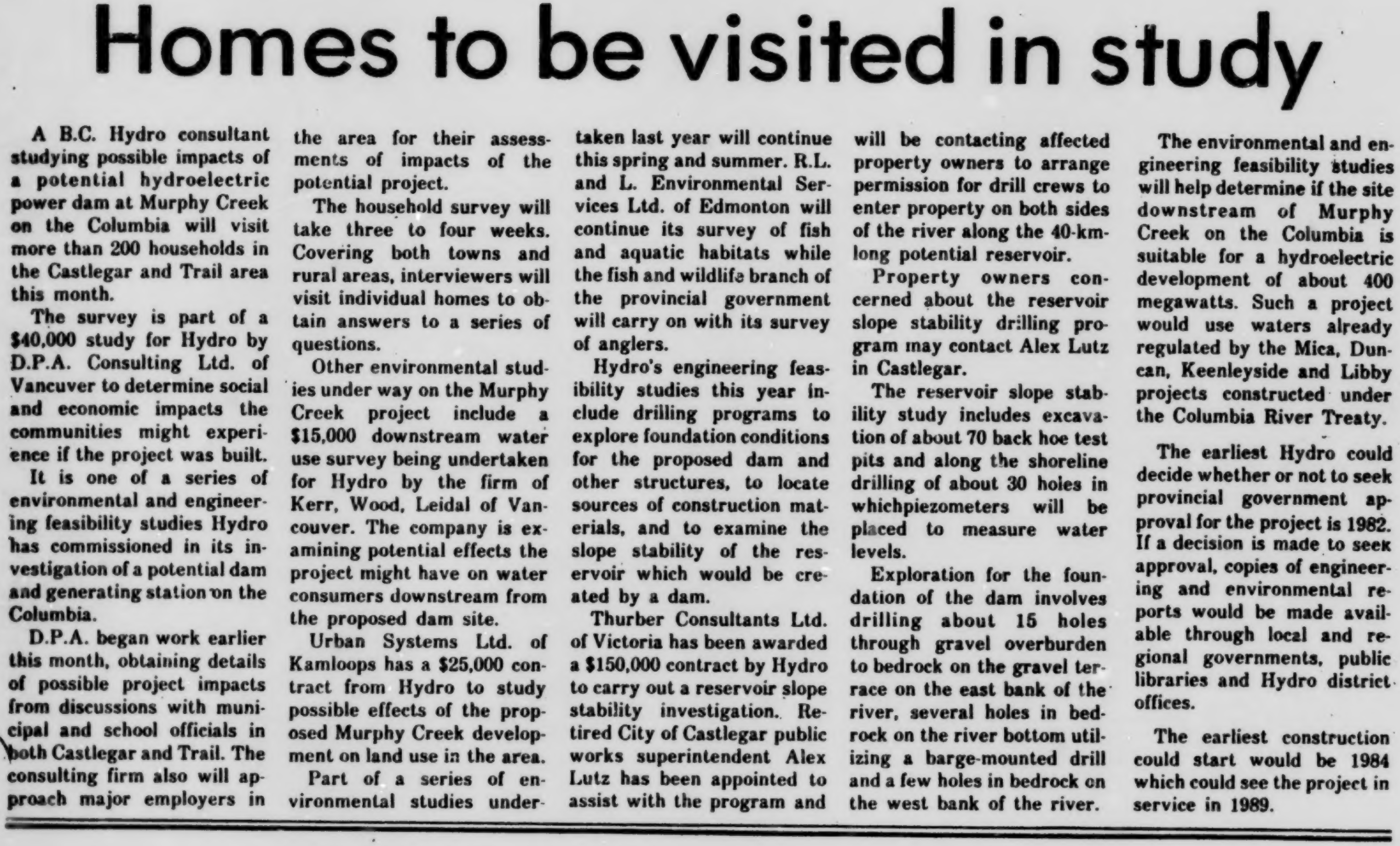
Hydro's engineering feasibility studies this year will include drilling programs to explore foundation conditions for the propsed dam and other structures, to locate sources of construction materials, and to examine the slope stability of the reservoir that would be created by the dam.

Tuber Consultants of Vancouver has been awarded a $15,000 contract to carry out a reservoir slope stability study. Retired City of Castlegar public works superintendent Alex Lutz has been appointed to assist with the project and will be contacting affected property owners to arrange permission for drilling work. Anyone requiring further information about the drilling can contact Lutz at 365-3258.

Trail Daily Times
April 8, 1981

... continued

EXHIBIT 2.2: continued



Homes to be visited in study

A B.C. Hydro consultant studying possible impacts of a potential hydroelectric power dam at Murphy Creek on the Columbia will visit more than 200 households in the Castlegar and Trail area this month.

The survey is part of a $40,000 study for Hydro by D.P.A. Consulting Ltd. of Vancouver to determine social and economic impacts the communities might experience if the project was built.

It is one of a series of environmental and engineering feasibility studies Hydro has commissioned in its investigation of a potential dam and generating station on the Columbia.

D.P.A. began work earlier this month, obtaining details of possible project impacts from discussions with municipal and school officials in both Castlegar and Trail. The consulting firm also will approach major employers in the area for their assessments of impacts of the potential project.

The household survey will take three to four weeks. Covering both towns and rural areas, interviewers will visit individual homes to obtain answers to a series of questions.

Other environmental studies under way on the Murphy Creek project include a $15,000 downstream water use survey being undertaken for Hydro by the firm of Kerr, Wood, Leidal of Vancouver. The company is examining potential effects the project might have on water consumers downstream from the proposed dam site.

Urban Systems Ltd. of Kamloops has a $25,000 contract from Hydro to study possible effects of the proposed Murphy Creek development on land use in the area.

Part of a series of environmental studies undertaken last year will continue this spring and summer. R.L. and L. Environmental Services Ltd. of Edmonton will continue its survey of fish and aquatic habitats while the fish and wildlife branch of the provincial government will carry on with its survey of anglers.

Hydro's engineering feasibility studies this year include drilling programs to explore foundation conditions for the proposed dam and other structures, to locate sources of construction materials, and to examine the slope stability of the reservoir which would be created by a dam.

Thurber Consultants Ltd. of Victoria has been awarded a $150,000 contract by Hydro to carry out a reservoir slope stability investigation. Retired City of Castlegar public works superintendent Alex Lutz has been appointed to assist with the program and will be contacting affected property owners to arrange permission for drill crews to enter property on both sides of the river along the 40-km-long potential reservoir.

Property owners concerned about the reservoir slope stability drilling program may contact Alex Lutz in Castlegar.

The reservoir slope stability study includes excavation of about 70 back hoe test pits and along the shoreline drilling of about 30 holes in whichpiezometers will be placed to measure water levels.

Exploration for the foundation of the dam involves drilling about 15 holes through gravel overburden to bedrock on the gravel terrace on the east bank of the river, several holes in bedrock on the river bottom utilizing a barge-mounted drill and a few holes in bedrock on the west bank of the river.

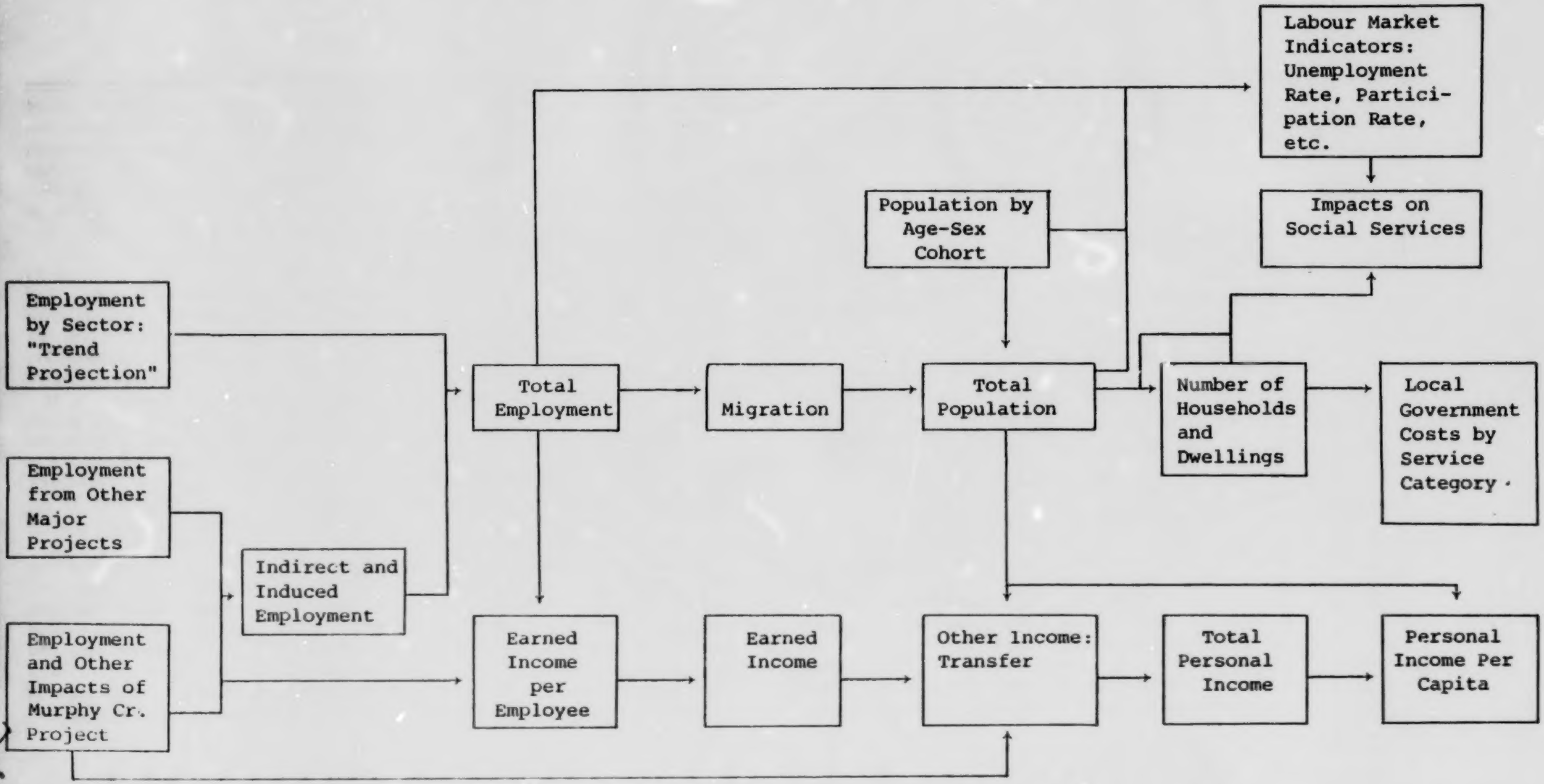
The environmental and engineering feasibility studies will help determine if the site downstream of Murphy Creek on the Columbia is suitable for a hydroelectric development of about 400 megawatts. Such a project would use waters already regulated by the Mica, Duncan, Keenleyside and Libby projects constructed under the Columbia River Treaty.

The earliest Hydro could decide whether or not to seek provincial government approval for the project is 1982. If a decision is made to seek approval, copies of engineering and environmental reports would be made available through local and regional governments, public libraries and Hydro district offices.

The earliest construction could start would be 1984 which could see the project in service in 1989.

Castlegar News April 8, 1981

EXHIBIT 2-3: OVERVIEW OF METHOD FOR MURPHY CREEK SOCIOECONOMIC IMPACT ASSESSMENT: QUANTITATIVE VARIABLES



Employment by Sector: "Trend Projection"
Employment from Other Major Projects
Employment and Other Impacts of Murphy Cr. Project
Indirect and Induced Employment
Total Employment
Migration
Population by Age-Sex Cohort
Total Population
Labour Market Indicators: Unemployment Rate, Participation Rate, etc.
Impacts on Social Services
Number of Households and Dwellings
Local Government Costs by Service Category
Earned Income per Employee
Earned Income
Other Income: Transfer
Total Personal Income
Personal Income Per Capita

3.0 PRESENT SOCIOECONOMIC CONDITIONS

3.1 Population

Table 3-1 summarizes population trends for the last 30 years. The West Kootenay region has grown at a moderate rate over the 1951-81 period, but at well below the pace indicated for the total province. The regional rate of increase, 1% per annum, was only a third of the provincial rate of advance. Trail, the largest city in this region maintained a stable population until about 1970 when lay-offs at the Cominco smelter resulted in a decline. Castlegar came into its own with construction of the Canadian Cellulose pulp and sawmill in the late 1950's. Since that time, growth in Castlegar and vicinity has offset the out-migration from Trail.

Table 3-2 shows the population distribution of the Castlegar/Trail area. Figures for 1971 and 1976 and for the larger municipalities in 1981 are census data. 1976 populations for Brilliant, Blueberry, and Fairview are from the Central Kootenay Regional Planning Commission, since census data corresponding to the community boundaries are not available. For the same reason, populations for Oasis and Rivervale are from the BC Ministry of Industry and Small Business Development. All 1981 figures are taken either directly or indirectly from the Census. The 1981 population figures at the school district level were prepared by the BC Central Statistics Bureau using Census data.

About 35% of the study area population live in School District #9, Castlegar. The City of Castlegar, with just over half the population, is the only municipality in this district. Most of the population in the unorganized area live in small communities along, or overlooking, the Columbia and Kootenay Rivers. School district #11, Trail, is relatively urbanized. Except for the City of Trail, most of the population resides in the smaller municipalities of Rossland, Fruitvale, Montrose, and Warfield. Only about 13%

TABLE 3-1: POPULATION: WEST KOOTENAY REGION 1951-1981

	1951	1961	1971	1976	1981	Average Annual Increase 1951-81	Average Annual Increase 1971-81
British Columbia	1,165,210	1,629,082	2,184,621	2,466,608	2,744,467	2.9	2.3
Region Total	62,471	72,758	76,187	80,668	85,277	1.0	1.1
City of Trail	11,430	11,580	11,149	9,980	9,599	-0.6	-1.5
% of Region	18.3	15.9	14.6	12.4	11.3		
City of Castlegar	1,329	2,253*	3,072*	6,309*	6,902	5.6	1.6
% of Region	2.1	3.6	4.0	7.9	8.1		

Source: 1951-1981 Census of Canada

* Boundary change since previous Census.

TABLE 3-2: POPULATION DISTRIBUTION, CASTLEGAR/TRAIL AREA

	1971	1976	1981
City of Castlegar	5,918	6,309	6,902
Robson	-	1,055	1,032
Raspberry	-	100	102
Brilliant	-	100	80
Ootischenia	-	570	674
Blueberry Creek	-	660	635
Fairview	-	120	146
Other Rural	-	2,546	2,929
Sub-Total School District #9, Castlegar	10,675	11,460	12,500
City of Trail	11,149	9,980	9,599
City of Rossland	3,896	3,716	3,967
Warfield	2,132	1,957	1,969
Fruitvale	1,379	1,481	1,904
Montrose	1,144	1,197	1,229
Genelle	-	720	805
Oasis	-	170	168
Rivervale	-	290	316
Other Rural	-	2,644	2,983
Sub-Total School District #11, Trail	23,020	22,155	22,940
Total Castlegar/Trail Area	33,695	33,615	35,440

Source: 1971, 1976, and 1981 Statistics Canada Census.

1981 Totals from Central Statistics Bureau, British Columbia School District Populations.

live outside the municipal boundaries.

Due to the dependence of the area on a few major industries, the economic base is subject to sudden changes which make it difficult to identify population trends. The Castlegar area has shown a sustained, moderate rate of growth. In contrast, the Trail area population is closely tied to the operation of Cominco. A reduction in Cominco staff in the early 1970's resulted in a population decline in the Trail area until 1977. Since then, an expansion program may have reversed the trend. However, Census data suggest that the population of the City of Trail has continued to decline, and surrounding municipalities such as Fruitvale, Rossland, and Montrose have absorbed the modest population gain which has occurred over the 1977-1981 period.

There has been a significant shift in population distribution since 1971. The rural proportion of the total population has increased from 24% to 28% (see Table 3-3). Of the municipalities, Trail and Warfield have declined, and only Fruitvale and Castlegar show significant increases. Planners

TABLE 3-3: AREA POPULATION GROWTH AND DISTRIBUTION 1971-1981

	Average Annual Increase 1971-1981 (%)	Share of Total 1971 (%)	Share of Total 1981 (%)
City of Castlegar	1.6	17.6	19.5
City of Trail	-1.5	33.1	27.1
City of Rossland	0.2	11.6	11.2
Village of Warfield	-0.8	6.3	5.6
Village of Fruitvale	3.3	4.1	5.4
Village of Montrose	0.7	3.4	3.5
Rural Castlegar SD#9	1.6	14.1	15.8
Rural Trail SD#11	2.6	9.9	12.1
Total Area	0.5	100.0	100.0

Source: Calculated from Table 3-2.

in the City of Trail and the Kootenay-Boundary Regional Planning Commission attribute this shift to a shortage of serviced lots in the older urban areas, and a desire among younger families for larger lots or acreages.

Overall, the age structure of the population in the Castlegar/Trail area is similar to that for the entire province. Closer analysis shows significant differences between Trail and the remainder of the Castlegar/Trail area (see Table 3-4). The rest of the area has a smaller proportion of people over age 65 and a larger proportion of school age children. Trail has only 16% under 15 years old (area has 22%), but 16% are over 65 (area has 11%). This is consistent with the fact that young families are choosing to locate in smaller communities. It also reflects the composition of the Cominco labour force. Many Trail residents are long-time Cominco employees, either retired, or nearing retirement age.

A review of average household size (Table 3-5) further substantiates the difference between Trail and the rest of the study area. The low household size is consistent with a high proportion of single pensioners and older couples without children at home. It may also reflect the presence of single construction workers employed on the Cominco expansion. The preference of young families shows up in the larger household size of the smaller communities.

3.2 Economy

The West Kootenay Region has a diversified resource-based economy, depending on agriculture, forestry, mining and related processing industries, and tourism. The importance of each varies among sub-regions. Agriculture is more significant to the western part of the Kootenay-Boundary Regional District. Forestry is more concentrated in the Central Kootenay Regional District. Mining takes place in several locations including Greenwood, the Slocan Valley, and

TABLE 3-4: POPULATION AGE DISTRIBUTION: CASTLEGAR/TRAIL AREA, 1981 (percentages)

Age Group	BC	Castelgar	School Dist. #9	Trail	School Dist. #11	Castlegar/ Trail area
0-4	7.0	7.2	7.6	5.5	6.9	7.1
5-14	14.5	15.6	16.3	10.8	14.3	15.0
15-34	35.7	34.7	35.0	33.6	35.4	35.3
35-64	32.0	32.6	31.6	34.1	31.6	31.6
65+	10.9	9.7	9.6	16.1	11.8	11.0

Source: Statistics Canada, 1981 Census; Central Statistics Bureau, BC. School District Populations.

TABLE 3-5: AVERAGE HOUSEHOLD SIZE AND NUMBER OF HOUSEHOLDS

	Average Household Size			Number of Households
	1971	1976	1981	
Regional Dist. of Central Kootenay	3.3	3.0	2.7	19,070
Castlegar	3.2	3.2	2.8	2,400
Robson		2.9	2.7	410
Raspberry		3.1	2.9	38
Brilliant		3.2	3.0	37
Ootischenia		3.0	2.8	210
Blueberry/Fairview		3.3	3.1	310
Regional District of Kootenay Boundary	3.3	3.0	2.8	12,100
Trail	3.1	2.8	2.5	3,730
Rossland	3.4	3.0	2.8	1,400
Fruitvale	3.6	3.4	2.9	650
Warfield	3.4	3.1	2.7	730
Montrose	3.7	3.5	3.2	385
Genelle		3.3	3.1	310
Oasis/Rivervale		3.1	2.9	160

Source: 1971, 1976, and 1981 Census of Canada. DPA estimates for smaller communities not reported in 1981 Census.

Nelson areas. The Cominco smelter and complementary operations dominate the Trail area.

Employment and income estimates for major industrial sectors in the West Kootenay region and the Castlegar/Trail area are shown in Tables 3-6 through 3-9.

3.2.1 Agriculture

Agriculture employed less than 3% of the regional labour force in 1981, and less than 4% in the Castlegar/Trail area. The BC Ministry of Agriculture reports that 885 persons in the region showed farm income on tax returns in 1976, with average gross production of $18,400.1 Net returns averaged under $1,000. According to the 1981 Census of Agriculture,[2] farm operators worked an average of six months at other employment.

The 1981 Census of Agriculture indicates 48 farms in the Trail subdivision and 90 in the Arrow Lakes subdivision, of which 30 are estimated to be in the Castlegar area. There were 991 farms reported in the region. Most farms are smaller than 60 hectares, and the average value of sales from farms in the study area was $10,500 to $12,500. Total production, based on census data, was about $1.5 million for the study area and $20.3 million for the region.

3.2.2 Forestry

Forestry and related manufacturing employ about 12% of the regional labour force and are the mainstay of several communities.3 Large sawmills are located at Grand Forks, Midway, Creston, Nakusp, Christina Lake, and Nelson. Within the Castlegar/Trail area, medium-sized mills are located at Fruitvale, and Thrums. The largest producer in the region is the BC Timber (formerly Canadian Cellulose) complex at Castlegar, which includes an integrated sawmill and pulpmill.

TABLE 3-6: WEST KOOTENAY REGION: EMPLOYED LABOUR FORCE BY INDUSTRY, 1971 AND 1981

	1971				1981			
Industry	Central Kootenay Regional District	Kootenay Boundary Regional District	Total West Kootenay		Central Kootenay Regional District	Kootenay Boundary Regional District	Total West Kootenay	
	#	#	#	%	#	#	#	%
Agriculture	700	300	1,000	3.7	600	400	1,000	2.8
Forestry, Fishing	900	200	1,100	4.0	1,200	400	1,600	4.5
Mines	700	800	1,500	5.5	600	1,500	2,100	5.9
Manufacturing	2,900	3,800	6,700	24.6	3,400	3,800	7,200	20.2
Construction	1,100	500	1,600	5.9	2,000	800	2,800	7.9
Transportation, Communications & Other Utilities	1,700	800	2,500	9.2	1,900	800	2,700	7.6
Trade	1,900	1,500	3,400	12.5	3,100	1,900	5,000	14.0
Finance, Insurance, Real Estate	400	300	700	2.6	600	400	1,000	2.8
Community, Business, Personal Service	3,700	2,400	6,100	22.4	5,800	3,400	9,200	25.8
Public Administration	900	500	1,400	5.1	1,200	700	1,900	5.3
Unspecified/Undefined	1,300	600	1,900	7.0	800	300	1,100	3.1
Total	15,500	11,700	27,200	100.0	21,200	14,400	35,600	100.0

Source: Statistics Canada, 1971 and 1981 Census of Canada; adjusted for differences between experienced and employed labour force for total province.

TABLE 3-7: CASTLEGAR/TRAIL AREA: EMPLOYED LABOUR FORCE BY INDUSTRY, 1981

Industry	Castlegar Area	Trail Area	Castlegar/Trail Area	
	#	#	#	%
Agriculture	300	300	600	3.9
Forestry, Fishing, Mines	100	100	200	1.3
Manufacturing	800	1,900	2,700	17.4
Construction	500	1,000	1,500	9.7
Transportation, Communication	400	900	1,300	8.4
Trade	1,000	1,800	2,800	18.1
Finance, Insurance, Real Estate	400	400	800	5.2
Community, Business, Personal Service	1,400	3,100	4,500	29.0
Public Administration	300	800	1,100	7.1
Total	5,200	10,300	15,500	100.0

Source: Central Statistics Bureau, Special Tabulation from the 1981 Census; adjusted for differences between experienced and employed labour force.

TABLE 3-8: WEST KOOTENAY REGION: INDUSTRIAL SECTOR PRODUCTION AND PAYROLL, 1980

Industry	Value of Production ($million)	Payroll ($million)
Agriculture	22	0.5
Mining	20	4.5
Forestry & Wood Products	363	95.0
Primary Metals	518	95.0
Other Manufacturing	67	11.0
Travel Industry	73	28.0
All Other Sectors	1,040	314.0
Total: All Industries	2,103	548.0

Sources: Statistics Canada. Census of Agriculture, 1976. s.c. 96-810.
BC Ministry of Mines and Petroleum Resources. Annual Reports.
Cominco Annual Reports.
Canadian Cellulose Annual Reports.
BC Ministry of Industry & Small Business Development, British Columbia Economic Activity, 1979 Review and Outlook, 1980.
Statistics Canada, 31-209, 72-202, 72-002.
BC Ministry of Forests, Nelson Region. Arrow TSA Yield Analysis Report, May 1981, Kootenay Lake TSA Yield Analysis, December 1980, Boundary TSA Yield Analysis Report, March 1981.
BC Ministry of Industry and Small Business Development. British Columbia Regional Index, 1978.
Regional District of Kootenay-Boundary, Economic Profile, September, 1979.
Regional District of Central Kootenay, Arrow Lakes Regional Plan, Economic Study, 1979.

NB: Production and payroll data are based on 1980 rather than 1981; 1981 was not a representative year because of strikes in the forest sector and weak prices in the primary metals sector.

TABLE 3-9: CASTLEGAR/TRAIL AREA: INDUSTRIAL SECTORS, PRODUCTION AND PAYROLL, 1980

Industry	Value of Production ($million)	Payroll ($thousand)
Agriculture	0.3	20
Mining	0.9	120
Forestry & Wood Products	191.0	33,000
Primary Metals	518.0	95,000
Other Manufacturing	36.0	5,900
Travel Industry	27.0	10,400
All Other Industries	390.0	107,300
Total: All Industries	1,164.1	251,740

Sources: Statistics Canada. Census of Agriculture, 1976. s.c. 96-810.
BC Ministry of Mines and Petroleum Resources. Annual Reports.
Cominco Annual Reports.
Canadian Cellulose Annual Reports.
BC Ministry of Industry & Small Business Development, British Columbia Economic Activity, 1979 Review and Outlook, 1980.
Statistics Canada, 31-209, 72-202, 72-002.
BC Ministry of Forests, Nelson Region. Arrow TSA Yield Analysis Report, May 1981, Kootenay Lake TSA Yield Analysis, December 1980, Boundary TSA Yield Analysis Report, March 1981.
BC Ministry of Industry and Small Business Development. British Columbia Regional Index, 1978.
Regional District of Kootenay-Boundary, Economic Profile, September 1979.
Regional District of Central Kootenay, Arrow Lakes Regional Plan, Economic Study, 1979.

NB: The figures in this table differ from the employed labour force figures in Table 3-7 for three reasons:

- productivity and wage rates vary greatly between industries;
- 1981 economic performance was very different from 1980 because of strikes in the forest sector and weak prices in the primary metals sector;
- Table 3-7 is based on place of residence while Table 3-9 is based on the location of establishments.

In 1981 the annual timber commitment in the West Kootenay region was over 2.2 million cubic metres.4 Close to this amount was being utilized, and prospects for an increase are limited. The Ministry of Forests (Nelson) indicates that an increase of 17% is possible in the Boundary Timber Area (TSA), a small increase may occur in the Kootenay Lake TSA, and there will probably be a reduction in the Arrow TSA. This will constrain sawmill production in the future. There may be chips available to supply increased pulp production, and BC Timber has several options for expansion under consideration.

In 1979, BC Timber employed approximately 450 people at its pulpmill in Castlegar and another 430 in the sawmill, making it the largest employer in the area after Cominco.5 Another 310 people were employed in smaller forest products operations near Castlegar and Trail. The current (1981) value of pulp production is over $100 million annually. Other wood production in the area is valued at more than $80 million. The Castelgar/Trail area produces more than half the value of all forest products in the West Kootenays.

3.2.3 Mining

Mining has a long history in the West Kootenays with numerous small producers in and out of production. Metals including gold, silver, lead, zinc, and copper have been the major contributor to the value of production. There are perhaps 15 operating mines in the region, most very small. Larger producers include the Silvana mine near Slocan, which produces silver, lead, and zinc, and the Highland Bell copper mine near Greenwood. These mines employ approximately 100 people each. Two others, the HB mine and the Phoenix mine, ceased production in 1978. The Ministry of Energy, Mines and Petroleum Resources reports 1978 production for the region of $10.5 million for metals and $5 million for construction and industrial minerals. The value of production in 1980 was estimated at $20 million.[6]

Two small metal mines operate in the Castlegar/Trail area. Both are near Rossland. Production in 1978 was about $83,000. Construction and industrial mineral production brought the total to $1.0 million.[7]

Most mineral production in the region is shipped to the smelter at Trail. Recently a new firm at Grand Forks has begun to manufacture insulation using mine tailings as raw material.

Cominco

As the single largest firm in the West Kootenays, Cominco dominates the Trail area and has considerable influence on the surrounding region. It is the largest non-ferrous smelter complex in the western world. The major metallurgic operations process lead and zinc concentrates to produce refined lead, zinc, gold, cadmium, bismuth, indium, and antimonial lead. By-products of the smelter feed an integrated fertilizer plant. The Trail complex also includes some administrative functions for other Cominco operations. Production in 1981 included 236,800 metric tons of zinc, 119,750 metric tons of lead, 640,700 grams of gold, 239.5 million grams of silver, and 366,500 metric tons of fertilizer. Total value exceeded $500 million8 in 1980, but experienced a significant decline in 1981 because of weaker metals prices.

Employment at Cominco is about 4,750 including about 825 people engaged in construction on a major expansion program (1981 figures). Expenditures over seven years, from 1977, are estimated to exceed $700 million in 1981 dollars; $600 million of which will be at Trail.9

Cominco accounts for almost one-third of the total employment in the study area, and nearly two-thirds of the basic industry. This concentration makes the local economy highly sensitive to changes in Cominco hiring. A reduction from

4,410 employees in 1966 to 3,600 in 1976 led to a substantial population decrease in the Trail area. The 1981 construction program has again brought people into the area. Cominco plans to keep as many of the construction workers as possible on staff to replace others lost through retirement or other attrition. Nonetheless, at least a levelling of growth can be expected when employment is reduced to an operating level of about 3,900 by 1987.[10]

3.2.4 Other Manufacturing

The other manufacturing in the region largely supplies the regional market. Most is in food processing, printing and publishing, or construction materials. Approximately 100 people are employed in these industries in the Castlegar/Trail area.

3.2.5 Travel Industry

Travel industry employment can be estimated separately from other trade and service employment based on a computer model of tourism impact.11 Estimates of tourism activity were prorated from the Kootenay region to the West Kootenay region and Castlegar/Trail area on the basis of the proportion of units of accommodation in each.

The annual income to the industry in 1980 is estimated at over $70 million in the West Kootenays, and about $27 million in the Castlegar/Trail area. Direct employment attributable to tourism is estimated at 990 people, 280 in accommodation services, 540 in other service industry, and 170 in related retail trade.

3.2.6 Construction

The construction industry in the West Kootenays serves both normal residential and other building markets, and the demands of major projects. The sequence of hydroelectric developments in the Kootenays has encouraged the establishment of a resident labour force which works primarily on such jobs. This is particularly true of the Castlegar area which, from 1964 through 1980, has seen the construction of the Duncan, Keenleyside, Kootenay Canal, and Seven Mile projects.

In 1971, construction accounted for 5.9% of the employed labour force in the study region. In 1981, this had increased to 7.9%. In the same year, construction employment for the Castlegar/Trail area was 1500 or 9.7% of the employed work force.

3.2.7 Other Industry

The remaining industries in the Castlegar/Trail area are primarily service oriented. There are approximately two jobs in the non-basic sector (which includes construction and local manufacturing) for every one in the basic (or export) industries (obtained by subtracting total employment in basic industries from the total employed labour force.) The remaining sectors include transportation/communications and utilities; trade; finance/insurance and real estate; community/business and personal service; and public administration. These can be expected to expand and contract approximately in proportion to the basic industries. Current employment in the non-basic sectors is estimated at 10,500 (see Table 4-6).

3.2.8 Labour Force Activity in Study Region and Area

As a consequence of the slow growth displayed by the basic sectors of the study region and area, growth in total employment in the West Kootenays and the Castlegar/Trail area has lagged behind the gains recorded in the total province (see Table 3-10). As a result, unemployment rates in the study region and area changed relatively little from 1971 to 1981, in contrast to a fairly strong decline experienced at

TABLE 3-10: LABOUR FORCE ACTIVITY IN STUDY REGION AND AREA: 1971-1981

	1971	1976	1981	Average Annual Increase 1971-81
Total Province				
Total Population	2,184,621	2,466,608	2,744,467	2.3
Working Age Population	1,575,070	1,871,485	2,125,735	3.0
Labour Force	930,030	1,118,840	1,389,215	4.1
Labour Force Participation Rate (%)	59.0	59.8	65.4	-
Total Employment	846,375	1,021,115	1,289,570	4.3
Unemployment Rate (%)	9.0	8.7	6.4	-
West Kootenay Region				
Total Population	76,187	80,668	85,277	1.1
Working Age Population	54,585	60,820	65,615	1.9
Labour Force	29,830	33,100	38,925	2.7
Labour Force Participation Rate	54.6	54.4	59.3	-
Total Employment	27,175	29,910	35,550	2.7
Unemployment Rate (%)	8.9	9.6	8.7	-
Castlegar/Trail Area				
Total Population	33,695	33,615	35,440	0.5
Working Age Population	24,020	25,260	27,230	1.3
Labour Force	13,310	13,950	16,650	2.3
Labour Force Participation Rate (%)	55.4	55.2	61.1	-
Total Employment	12,170	12,650	15,465	2.4
Unemployment Rate	8.6	9.3	7.2	-

Source: Census of Canada 1971 and 1981.

the provincial level. As well, labour force participation rates in the study region and area continue to be significantly below the provincial average. This reflects the male orientation of forestry, mining, and related primary manufacturing, the dominant sectors in the regional economy, and the relatively small contribution made by the service sectors, the activities which provide the bulk of female employment. In 1981 the service sectors, broadly defined,[12] accounted for 56% of the employment in the West Kootenays and 68% of the employment in the Castlegar/Trail area. The corresponding figure for the total province was about 70%.

3.2.9 Personal Income

Table 3-11 presents the distribution of income and other income data for the West Kootenay region, based on income tax return data. Table 3-12 presents data on average income per return for different localities within the region. Provincial figures are provided for purposes of comparison. When compared with the provincial norm, average income per tax return has tended to decline in many parts of the region over the past decade. This probably relates to the slower growth in employment relative to many other parts of the province. Within the study region, the highest per capita incomes are indicated for Montrose, Trail-Rossland, and Castlegar, while the more rural areas tend to lag behind the regional average.

Average income from tax returns can be used in conjunction with income data from the 1971 Census and personal income figures for the total province to prepare estimates of personal income per capita that are comparable with National Accounts data at the national and provincial levels. These are indicated below for 1971 and 1980.

TABLE 3-11: AVERAGE PERSONAL INCOME FROM TAX RETURNS: WEST KOOTENAY REGION

	Total Province				Trail/Rossland Area				Kootenay Boundary R.D.				Central Kootenay R.D.			
	1971	1979	1980	1981	1971	1979	1980	1981	1971	1979	1980	1981	1971	1979	1980	1981
Average Wage and Salary Income ($)	5128	10120	11296	12268	5176	10979	12399	13757	5134	10394	11581	12576	4857	9211	10271	10607
% of Province	-	-			100.9	108.5	109.8	112.1	100.1	102.7	102.5	102.5	94.7	91.0	90.9	86.5
Average Income All sources ($)	6623	13277	15062	16631	6220	13789	15661	17786	6079	12961	14599	16354	5711	11838	13362	14449
% of Province	-	-	-	-	99.3	103.9	104.0	106.9	97.1	97.6	96.9	98.3	91.2	89.2	88.7	86.9

Income Distribution (%)	Total Province 1979	Total Province 1981	Trail/Rossland Area 1979	Trail/Rossland Area 1981	Kootenay Boundary R.D. 1979	Kootenay Boundary R.D. 1981	Central Kootenay R.D. 1979	Central Kootenay R.D. 1981
Less than $10,000	46.9	40.0	42.8	36.0	46.2	41.0	51.3	45.7
$10,000 - $14,999	16.9	14.9	14.9	12.1	13.9	11.7	14.7	13.7
$15,000 - $19,999	13.9	12.8	17.1	10.5	16.5	10.3	13.7	11.7
$20,000 - $29,999	15.9	18.7	19.8	24.7	18.7	22.5	15.6	18.0
$30,000 and over	6.4	13.6	5.6	16.6	4.8	14.6	4.7	10.9

Source: Revenue Canada. Taxation Statistics, 1973, 1981, 1982, and 1983. Based on total income from all tax returns divided by the total number of returns (the resulting figure can be used as a "proxy" for per capita income per employee.)

Note: Revenue Canada data are not reported in this document for the Castlegar area.

TABLE 3-12: AVERAGE PERSONAL INCOME FROM TAX RETURNS, VARIOUS LOCALITIES, 1977-1981

	1977		1978		1979		1980		1981	
	$	% of Province	$	% of Province	$	% of Province	$	% of Province	$	% of Province
Total Province	11,929	100.0	12,045	100.0	13,277	100.0	15,062	100.0	16,631	100.0
Central Kootenay RD	11,144	93.4	10,824	89.9	11,838	89.2	13,362	88.7	14,449	86.9
Castlegar	12,850	107.7	12,145	100.8	13,271	100.0	15,093	100.2	16,152	97.1
Subdivision A	12,128	101.7	11,147	92.5	11,963	90.1	13,437	89.2	14,328	86.2
Kootenay Boundary RD	11,926	100.0	11,589	96.2	12,961	97.7	14,599	96.9	16,354	98.3
Trail/Rossland	12,447	104.4	12,320	102.3	13,789	103.9	15,661	103.9	17,786	106.9
Fruitvale	13,301	111.5	11,544	95.8	13,085	98.6	14,811	98.3	16,891	101.6
Montrose	12,919	108.3	12,136	100.8	13,974	105.2	16,195	107.5	18,149	109.1
Subdivision A	12,199	102.3	11,513	95.6	12,642	95.2	14,080	93.5	16,796	100.9

Source: Revenue Canada. Taxation Statistics, 1977-1981. Britsh Columbia Taxation Statistics, Central Statistics Bureau, Victoria, 1977-1981

	Personal Income Per Capita (Current $) 1971	1980
Total Province	3,740	11,000
West Kootenay Region	3,260	9,400
% of Province	87.0	85.5
Trail/Castlegar Area	3,540	10,300
% of Province	94.5	93.5

These estimates suggest that per capita personal income in the study area is significantly above per capita income in the study region. This situation results from the relatively greater importance of Trail/Rossland and other higher income centres in the study area, and the major positions of a few major employers (who pay well above average wages) in the study area economy.

3.2.10 Concluding Comment

To summarize, the economic performance of the study region and area does not compare favourably with economic trends in the province as a whole. Over the past decade, growth in the study region and area has been significantly below the provincial norm with respect to population, employment, and per capita income. This below average performance largely reflects the slow growth displayed by the region's basic economic sectors, but a secondary factor is the emergence of Cranbrook as the dominant service centre in the Kootenays. This has particularly dampened commercial expansion in the Trail/Rossland area.

3.3 Housing and Physical Infrastructure

3.3.1 Transportation

The Castlegar/Trail area is serviced by the Southern Trans-Canada Highway which is an East-West route through Castlegar. A controlled access highway connects Trail and Castlegar. CP Rail provides freight service to Trail, but there are no rail passenger services. Greyhound Bus Lines has scheduled bus service from Castlegar and Trail. Both communities have taxi services and Trail has a public transit system.

Air service is provided by a small local airport at Trail for local pilots and small aircraft, and a regional airport at Castlegar. Pacific Western Airlines operates scheduled flights twice daily from Vancouver and once a day from Calgary. In 1980, there were 41,286 flights in and out of the Castlegar Airport, about half of them non-scheduled. There is some interference of flights due to weather, mostly in the months of November through February.

However, improvements in 1982 at the Castlegar airport are expected to result in a reduction in the number of PWA flights cancelled because of poor weather conditions. A track guidance localizer at the Castlegar Industrial Park will enable the implementation of a new visual approach procedure which will allow planes to land and take off with a lower cloud ceiling than previously.

Transport Canada had hoped to expand the existing airport facilities to almost three times their current size but funding has not yet been approved.

3.3.2 Water Supply and Wastewater Systems

A description of the occurrence of ground-water, its flow systems and use along the Columbia River between Castlegar and the Canada-US Boundary is contained in a report by Pacific Hydrology Consultants Ltd.[13]

An inventory of municipal water supply and wastewater facilities is presented in a report prepared by Kerr Wood Leidal Associates Ltd.[14] Table 3-13 contains a summary abstracted from this report.

TABLE 3-13: WATER SUPPLY AND WASTEWATER SYSTEMS IN THE CASTLEGAR/TRAIL STUDY AREA

Location	Water Supply	Location	Wastewater
Castlegar	Significant excess capacity to support a population of 9,600 plus an industrial park. System can be relatively easily modified to provide additional capacity for an expanded service area.	City of Castlegar	There is excess capacity to provide for at least a doubling of the present population.
Robson-Raspberry	The existing sources of water supply for Robson and West Raspberry have sufficient capacity to provide for present and projected water demands. But, the system is inadequate to convey the required rates of flow. East Raspberry uses private well systems.		Individual septic tanks.
Brilliant	Water is supplied by a community well and three private well systems.		Individual septic tanks.
Ootischenia	Water supply originally inadequate and probably will be increased if further development is to occur.		Individual septic tanks.
Blueberry-Fairview	Existing sources of supply are being utilized.		Individual septic tanks.

. . . . continued

TABLE 3-13: continued

Location	Water Supply	Location	Wastewater
Genelle-China Creek	System adequate.		Individual septic tanks.
Oasis-Rivervale	Systems are currently being utilized to full capacity.		RDKB operates the Columbia Pollution Control Centre serving Trail, Rossland, Warfield, Rivervale, and Oasis. There is significant excess capacity at the treatment plant to provide for a 50% increase in population.
Trail	Significant excess capacity to support a population increase up to 11,000 - 12,000.		
Tadanac-Warfield	Tadanac plant is operating below capacity. No upgrading required to provide for an increase in water supply. In Warfield water supply requirements exceed plant capacity but this is not necessarily critical.		
Montrose-Beaver Falls-Fruitvale	The three systems are at best marginally adequate to provide for present water useage.	Beaver Creek Valley	Houses located in Beaver Falls and outside the Fruitvale municipal boundary are on septic tanks. Montrose and Fruitvale have community wastewater systems with surplus capacity.

Source: Kerr, Wood, Leidal Associates Ltd. Murphy Creek Hydroelectric Project, Downstream Water Use Study, Draft Report. July 1981.

3.3.3 Housing

Following is a summary of the potential for housing supply in the study area.[15]

Castlegar

The land development potential could support double the population. Two subdivisions under development in 1982 contain approximately 46 lots for single family units, a replot program in South Castlegar will create approximately 184 single family unit lots, and there is zoning in South Castlegar for a mobile home park of up to 200 units. There are multiple family sites for approximately 230 units, and areas zoned for multiple family use could accommodate an additional 470 units. The vacancy rate for the rental sector in the spring, 1982, was 10.2%, and this had decreased to 6.1% in the fall, 1983.

Robson-Raspberry

This area has been designated a priority for residential development in the Regional District settlement plan. There is capability for approximately 200 more units, but Robson would require an expanded waterworks system.

Brilliant

This is also a priority area for residential development. The land development potential is approximately 19 lots.

Ootischenia

Further residential development will be limited by airport restrictions. There is potential for about 100 units, providing a water supply is developed.

Blueberry/Fairview

This is also a primary settlement area in the regional plan. There is potential for approximately 225 single family units, but any further development is contingent on upgrading of the water system.

Trail Area

The Kootenay Boundary Regional District reported in 1980 that a total of 600 residential lots were at varying stages of development in Rossland, Warfield, Montrose, and Fruitvale. In the city of Trail there is a scarcity of serviced developable land and the potential for developing the adjacent outlying areas is limited because the topographical conditions make development expensive. Nevertheless, the housing supply in the Trail area appears to be adequate since the vacancy rate in the rental sector of the Trail Census Agglomeration in the spring of 1982 was 12.9% and since there is considerable development potential in the municipalities around Trail.

In sum, the housing market in the study area is expected to soften in the future because of economic conditions, thus creating some vacancies in the existing housing stock. Ample land is available for new residential development and there are sufficient building contractors to meet the demand for new housing construction. The relative costs of new development in different areas have not been assessed.

3.4 Municipal Administration and Finances

The West Kootenay Region includes two regional districts, 17 municipalities, and 46 improvement districts. The Regional District of Kootenay-Boundary includes the incorporated municipalities of Fruitvale, Grand Forks, Greenwood, Midway, Montrose, Rossland, Trail, and Warfield. Municipalities in the Regional District of Central Kootenay include Castlegar, Creston, Kaslo, Nakusp, Nelson, New Denver, Salmo, Silverton, and Slocan. Trail is the major administrative centre for Kootenay-Boundary and Nelson for Central Kootenay.

The Castlegar/Trail study area includes electoral areas A and B of Kootenay-Boundary Regional District and electoral areas I and J of Central Kootenay Regional District. These areas are equivalent to School Districts #11 (Trail) and #9

(Castlegar). A summary of local government revenues is presented in Table 3-14.

Revenues in 1981 for the municipalities and improvement districts within this area are shown in Table 3-15. The total exceeded $28 million of which over $11 million was for school purposes. Corresponding figures for local expenditures are presented in Table 3-16. For comparative purposes the revenue and expenditure data have been converted to per capita figures in Tables 3-17 and 3-18.

On a per capita basis, municipal revenues in the area compare closely to the provincial average but differ in terms of distribution. Local taxation accounts for a lower percentage of revenues while transfers from senior governments and sale of services and other local sources are proportionately higher. About $220 is raised from local taxation, $140 from sale of services and other local sources, and $105 from senior government sources. The senior government contribution is about 20% of municipal revenue. School revenues on a per capita basis are comparable to the provincial average.

Comparing expenditures, the study area is close to the provincial average with respect to the distribution among categories, but is significantly higher when all categories are combined. The major differences are the relatively high cost of transportation services in Castlegar, Rossland, and Trail and relatively high utility costs in Trail and Rossland. Castlegar and Montrose both have debt servicing which exceeds 16% of the municipal budget.

Table 3-19 shows mill rates in effect during 1981 for municipalities in the Castlegar/Trail area. The larger municipalities, with a higher level of services, also have the higher tax rates. Table 3-20 shows the taxable assessment for the six municipalities. The industrial plants in Trail and Castlegar result in a per capita assessment base

TABLE 3-14: LOCAL GOVERNMENT REVENUE, WEST KOOTENAY REGION, 1981 ($000 - 1981)

	Central Kootenay		Kootenay Boundary		
	Municipal	Regional	Municipal	Regional	Total
General Revenue Fund					
Local Taxation	6,791	1,318	6,415	563	15,087
Grants in Lieu of Taxes	188	-	127	-	315
Transfers from Other Governments	2,642	1,479	3,527	1,708	9,356
Other General Revenue	3,787	1,573	3,039	750	9,149
TOTAL MUNICIPAL REVENUE	13,408	4,370	13,108	3,021	33,907
SCHOOL DISTRICT TAXATION*	8,239	-	10,038	-	18,277
Sewer Revenue Fund					
Transfers from Provincial Government	603	-	149	52	804
Sales of Services and Other Revenue	1,243	-	1,142	542	2,927
TOTAL SEWER SYSTEM REVENUE	1,846	-	1,291	594	3,731
Water Utility Revenue Fund					
Transfers from Provincial Government	342	165	60	-	567
Sales of Services and Other Revenue	1,120	222	1,091	3	2,436
TOTAL UTILITY REVENUE	1,462	387	1,151	3	3,003
TOTAL LOCAL GOVERNMENT REVENUE	24,955	4,757	25,588	3,618	58,918

* Plus other collections for other governments.

Source: Ministry of Municipal Affairs. Municipal Statistics for the Year Ended December 31, 1981. No data were compiled on Improvement Districts during 1981.

TABLE 3-15: MUNICIPAL REVENUE: CASTLEGAR/TRAIL AREA, 1981 ($'000 1981)

	Castlegar	Rossland	Trail	Fruitvale	Montrose	Warfield	Total
General Revenue Fund							
Municipal Taxation	2,342	927	3,966	182	105	262	7,784
Grants in Lieu of Taxes	18	10	86	1	2	-	117
Transfers from Senior Governments	580	388	1,892	180	128	187	3,355
Other General Revenue	366	485	1,490	56	41	69	2,507
TOTAL GENERAL REVENUE	3,289	1,810	7,435	419	276	518	13,763
SCHOOL DISTRICT TAXATION*	3,093	486	7,181	287	150	266	11,463
Sewer Revenue Fund							
Transfers from Provincial Government	323	38	-	-	16	10	371
Sales of Services and Other Revenue	336	241	490	126	31	78	1,302
TOTAL SEWER SYSTEM REVENUE	659	279	490	126	46	88	1,673
Water Utility System Fund							
Transfers from Provincial Government	-	6	-	-	50	0	56
Sales of Services and Other Revenue	203	211	557	-	56	89	1,116
TOTAL UTILITY REVENUE	203	218	557	-	106	89	1,172
TOTAL LOCAL REVENUE	7,244	2,793	15,663	832	578	961	28,071

* Plus other collections for other governments.

Source: Ministry of Municipal Affairs. Municipal Statistics for the Year Ended December 31, 1981.

TABLE 3-16: MUNICIPAL EXPENDITURE TRAIL/CASTLEGAR AREA, 1981 ($'000 - 1981)

	Castlegar	Rossland	Trail	Fruitvale	Montrose	Warfield	Total
General Expenditure							
General Government[1]	460	204	775	119	81	128	1,767
Administsration of Justice	284	5	502	-	-	-	791
Fire Protection	104	141	504	1	17	28	795
Transportation	786	470	1,080	93	33	99	2,561
Environment, Pub. Health & Welfare	208	139	468	42	16	33	906
Recreation & Culture	171	210	977	24	15	104	1,501
Debt Charges	158	153	366	-	-	-	677
Other[2]	1,107	519	3,342	162	109	116	5,355
TOTAL GENERAL EXPENDITURE	3,278	1,841	8,014	441	271	508	14,353
SCHOOL TAXES TRANSMITTED[3]	3,093	486	7,048	287	150	266	11,330
Sewer System Expenditure							
Operation & Maintenance	160	258	488	32	19	88	1,045
Debt Charges	499	20	3	95	27	-	644
TOTAL SEWER SYSTEM EXPENDITURE	659	279	490	126	46	89	1,689
Utility Expenditure							
Operation & Maintenance	178	191	417	-	33	89	908
Debt Charges	25	27	137	-	73	-	262
TOTAL UTILITY EXPENDITURE	203	218	554	-	106	89	1,170
TOTAL LOCAL EXPENDITURE	7,233	2,824	16,106	854	573	952	28,542

1. Includes administration, other protective services, and environmental development services.
2. Mainly transfers to own accounts and regional districts .
3. Includes other taxes transmitted.

Note: Columns may not add to totals due to rounding.

Source: Ministry of Municipal Affairs. Municipal Statistics for the Year Ended December 31, 1981.

TABLE 3-17: PER CAPITA LOCAL GOVERNMENT REVENUES: CASTLEGAR/TRAIL AREA (1981 $)

Source	Castlegar	Rossland	Trail	Fruitvale	Montrose	Warfield	Study Area Average[2]	BC Average[3]
Municipal Taxation	339.3	233.7	413.2	95.6	85.4	133.1	219.6	259.4
Senior Government Transfers	130.8	108.9	197.1	94.5	157.9	100.0	106.7	90.2
Other	133.7	238.7	273.2	96.1	105.8	119.9	142.3	119.9
Total Municipal Revenue	603.8	581.3	883.5	286.2	349.1	353.0	468.6	469.5
School District Taxation[1]	448.1	122.5	748.1	150.7	122.0	135.1	323.4	322.5
Total Local Government Revenue	1,051.9	703.8	1,631.6	436.9	471.1	488.1	792.0	792.0

1. Plus other collections for other governments.
2. Excluding the Improvement Districts.
3. The BC average is based on all municipalities in the province except for the City of Vancouver.

Source: Ministry of Municipal Affairs. Municipal Statistics, 1981. Per capita values are based on population Tables 3-2, 3-15, from 1981 Census.

TABLE 3-18: PER CAPITA LOCAL EXPENDITURE CASTLEGAR/TRAIL AREA (1980$)

Source	Castlegar	Rossland	Trail	Fruitvale	Montrose	Warfield	Study Area Average[1]	BC Average[2]
General Government	66.6	51.4	80.7	62.5	65.9	65.0	49.9	46.2
Administration of Justice	41.1	1.3	52.3	--	--	--	22.3	52.3
Fire Protection	15.1	35.5	52.5	0.5	13.8	14.2	22.4	44.0
Transportation Services	113.9	118.5	112.5	48.8	26.9	50.3	72.3	66.7
Environ, Pub Hlth, Welf.	30.1	35.0	48.8	22.1	13.0	16.8	25.6	42.9
Recreation & Culture	24.8	52.9	101.8	12.6	12.2	52.8	42.4	60.9
Sewer & Other Util. Op.	50.0	113.2	94.3	16.8	42.3	89.9	55.1	63.0
Debt Charges	98.8	50.4	52.7	49.9	81.4	--	44.7	75.3
Other	160.4	130.8	348.2	85.1	88.7	58.9	151.1	226.1
Total Municipal Exenditure	600.8	589.0	943.8	298.3	344.2	347.9	485.8	677.4
School District Taxes Transmitted	448.1	122.5	734.2	150.7	122.1	135.1	319.7	449.4
Total Local Government Expenditure	1048.9	711.5	1678.0	449.0	466.3	483.0	805.2	1126.8

1. Excluding the Improvement Districts.
2. The BC average is based on all municipalities in the province except for the City of Vancouver.

Source: Table 3-20. Per capita values are based on population estimates for 1980 derived through inter-polating the 1976 and 1982 figures from the Census.

TABLE 3-19: MUNICIPAL TAX RATES, 1981 (mills)

	Municipal Purposes		Regional District			
	General	Debt	Municipal Base	Hospital Base	Total[1]	Total[1]
Castlegar	50.38	2.63	-	8.41	120.25	106.49
Rossland	16.41	17.59	-	14.81	108.59	87.42
Trail	48.00	3.54	-	1.10	110.42	100.55
Fruitvale	26.00	-	7.38	-	91.16	82.38[2]
Montrose	17.00	-	7.23	-	82.01	71.26
Warfield	30.00	-	-	4.52	92.30	85.05

Source: Ministry of Municipal Affairs, Municipal Statistics for the Year Ended December 31, 1981.

[1] Includes Hospital, Municipal Finance Authority and Assessment Authority and School rates: for Castlegar hospital rate is 2.31, for others 3.13; MFA is 0.02; Purposes Assessment Authority is 1.30 in all cases; for Castlegar School is 55.20, for others 53.33.

TABLE 3-20: TOTAL AND PER CAPITA TAXABLE ASSESSMENT: 1980 and 1981 (Current $)

		General Purposes		School Purposes	
		Total ($'000)	Per Capita ($)	Total ($'000)	Per Capita ($)
Castlegar	1980	31,509	4,647	49,451	7,294
	1981	30,937	4,482	52,572	7,617
Rossland	1980	7,735	1,973	8,115	2,070
	1981	7,868	1,983	8,345	2,104
Trail	1980	64,937	6,708	100,839	10,417
	1981	74,367	7,747	121,962	12,706
Fruitvale	1980	4,296	2,360	4,623	2,540
	1981	4,224	2,218	4,628	2,431
Montrose	1980	2,746	2,251	2,846	2,332
	1981	2,470	2,010	2,593	2,110
Warfield	1980	4,691	2,381	4,867	2,470
	1981	4,405	2,237	4,608	2,340
Study Area Totals & Averages	1980	115,914	4,565	170,741	6,725
	1981	124,271	4,860	194,707	7,615

Source: British Columbia Assessment Authority. Annual Report, 1980. Per capita values based on municipal population estimates. 1980 populations are derived through interpolating the 1976 and 1981 Census figures.

at least double that of the other communities. In general, municipalities have the choice of raising the same per capita revenue at less than half the tax rate, or providing more services for the same rate. Castlegar and Trail appear to be favouring the latter course.

3.5 Local Services

The following inventory of health, education, social assistance, and protective services in Castlegar and Trail was obtained from discussions with local service professionals supplemented by statistical information from the appropriate federal and provincial government Ministries. This data was gathered during April, 1981. Updated information on local services in the Castlegar area was obtained in April, 1982, but no updates were obtained for the Trail area. All estimates of present level of service per capita were based on the 1981 school district populations presented in Table 3-2 (Castlegar, SD #9: population 12,500. Trail, SD #11: population 22,940. Total: 35,440). Appendix C contains a list of the individuals and organizations contacted for information pertaining to this section.

3.5.1 Medical and Health Services

(a) Hospitals and Physicians

The Trail Regional Hospital serves the surrounding rural area and the communities of Warfield, Montrose and Fruitvale and acts as a referral centre for the West Kootenays. The Trail hospital has 228 beds; 50 extended care and 178 acute care. It offers a full range of medical services including emergency, day-care, medical, surgical, pediatric, obstetrics and gynaecology, cardio-pulmonary, rehabilitation, rehabilitation medicine, and a full range of diagnostic services. It has the only neurologist and ultrasound equipment in the Kootenays.

Rossland has its own community hospital, Mater Misercordiate with 15 extended care beds and 26 acute care beds. It provides routine medical treatment and general surgery for low risk patients.

Although the Trail hospital operates at almost full capacity, there is still excess capability and no waiting list. In Rossland, extended care is operating at 100% and acute care at 60%. For both hospitals future expansion will be in the area of extended care because of the aging population and a growing trend for older people to remain in the area upon retirement.

The intermediate care facilities for the Trail area consist of 84 beds; Kiro Manor provides personal care for 82 people; and 35 self-care apartments for Senior Citizens are being developed by the Rotary Club.

The Castlegar and District Hospital has 70 beds: 55 of these are acute care beds and 15 are extended care beds. In addition, Raspberry Lodge has 18 intermediate care beds. The ratio of beds per 10,000 population in Castlegar is not as favorable as in Trail (see Table 3-21), but is certainly adequate. The occupancy rate for 1981 was 76%. There is no shortage of acute care beds but there is a waiting list for extended care. This demand has resulted in long-term care patients being placed in acute care beds causing periodic bed shortages. The hospital has applied for an expansion project to construct a new wing which would have 35 long-term care beds and 20 intermediate care beds. Although this application has been recognized by the Ministry of Health as a priority, no definite commitment to the project will be made until the spending freeze is lifted. Therefore, there may be a shortage of intermediate and extended care beds in Castlegar in the near future. However, it should be noted that in 1981, the rated hospital bed capacity per 10,000 population was better in the Central Kootenay Regional Hospital District than the average for non-metropolitan areas in BC (see Table 3-21).

TABLE 3-21: RATED HOSPITAL BED CAPACITY PER 10,000 POPULATION, MARCH 1981

Regional Hospital District	Acute Care Beds	Extended Care Beds	Bassinets
Non-metropolitan, subtotal	41.65	15.42	6.51
Central Kootenay	48.61	24.40	7.74
Kootenay Boundary	73.75	28.75	8.75
School District #9 (Castlegar)	44.12	12.04	--
School District #11 (Trail)	93.19	35.70	--

Sources: Division of Health Services Research and Development, Health Sciences Centre, University of British Columbia. Roll Call 81, March, 1982.
DPA calculations for Castlegar area.
Health Sciences Centre data for Trail area.

There are 44 doctors in the Trail School District for a ratio of 20.40 doctors/10,000 people (Health Sciences Centre data for 1981) which is comparable to the provincial average of 21 doctors/10,000 (Roll Call Update, 1980). In the Kootenay Boundary Regional District as a whole, there were 16.88 physicians/10,000 people in 1981 which is better than the non-metropolitan provincial average of 13.57 doctors/10,000 people. In Castlegar there are 12 doctors, some with postgraduate training in surgery but no specialists. Their ratio is less favorable than Trail with only 10.52 doctors/10,000 people in 1981 (Health Sciences Centre data). The Central Kootenay Regional District has a ratio of 11.90 doctors/10,000 population which is below the provincial average for non-metropolitan areas. Table 3-22 summarizes the relevant physician/population ratios for 1981.

(b) Public Health

The area is served by the West Kootenay Health Unit located in Trail with a branch office in Castlegar. The Unit

TABLE 3-22: NUMBER OF DIRECTORY ACTIVE PHYSICIANS PER 10,000 POPULATION, SEPTEMBER, 1981

Regional Hospital District	Non-Post Graduate	Post Graduate	Total
Non-metropolitan, subtotal	13.54	0.02	13.57
Central Kootenay	11.90	0.00	11.90
Kootenay Boundary	16.56	0.31	16.88
School District #9 (Castlegar)	10.52	0.00	9.60

Sources: Division of Health Services Research and Development, Health Sciences Centre, University of British Columbia. Roll Call 81, March, 1982. DPA calculations for Castlegar area.

TABLE 3-23: WEST KOOTENAY HEALTH UNIT STAFF, APRIL 1981

	Trail	Castlegar
Physician	1*	-
Health Inspector	1	1
Speech Therapist	1	-
Audiologist	1	-
Dental Assistant	1	-
Public Health Nurse	7	3
Home Care Nurse	4 Full Time, 7 Part Time	1 Full Time 2 Part Time
Long Term Care Assessor	-	1
	16 Full Time 7 Part Time	6 Full Time 2 Part Time

*The Health Unit Physician's office is in Trail, but he regularly visits the Castlegar office.

Source: West Kootenay Health District, April 1981 provides a multiplicity of health services including enforcement of health regulations, home care, assistance to parents and their children, and communicable disease control. The staff is shown in Table 3-23.

The West Kootenay Health District is experiencing staff shortages, particularly in the long term care program. There is a shortage of qualified nurses in the province applying for public health positions and many positions are filled by temporary staff. As a result the available staff are carrying a very heavy caseload.

(c) Mental Health

Outpatient services are provided by a Mental Health Unit in Trail with a branch office in Castlegar. In Trail, the staff consists of a psychologist, a social work consultant, and a boarding home social worker. Castlegar has a part-time psychologist and a psychiatric worker. The only inpatient services are in Trail with 24 psychiatric beds and one psychiatrist. In 1981 the hospital was looking for a professional to treat children and adolescents.

Local professionals feel there are not sufficient mental health facilities and personnel, particularly in Castlegar. There are no facilities for chronic mental patients and no special services for alcoholics, other than Alcoholics Anonymous.

(d) Dental Health

The Castelgar/Trail area has an acceptable number of dentists, but there are no dental specialists. The Trail area has 9 dentists for a 1981 ratio of 4.0 dentists/10,000 people and Castelgar has 5 dentists for a 1981 ratio of 4.0 denstists/10,000 people. The provincial average for non-metropolitan areas is 4.46 dentists/10,000 people (Roll Call'81) so except for the lack of specialists, dental services are adequate.

TABLE 3-24: NUMBER OF LICENSED DENTISTS PER 10,000 POPULATION, SPECIALISTS AND NON-SPECIALISTS, SEPTEMBER, 1981

Regional Hospital District	Non-Specialist	Specialist	Total
Non-metropolitan, subtotal	4.30	0.16	4.46
Central Kootenay	4.96	0.00	4.96
Kootenay Boundary	3.75	0.00	3.75
School District #9 (Castlegar)	4.00	0.00	4.00

Sources: Division of Health Services Research and Development, Health Sciences Centre, University of British Columbia. Roll Call 81, March, 1982. DPA calculations for Castlegar area.

(e) Ambulance and Fire Protection, and Emergency Services

The City of Trail Fire Department employs 16 full-time personnel. The equipment consists of one fire truck with a 75 foot aerial ladder, one main pumper fire truck, one trailer pump, a station wagon, and two ambulances. Fruitvale and Montrose have their own firehalls and Montrose and Rossland also have ambulance units. Trail is considering expanding the fire hall.

The Castlegar fire unit (North Castlegar, South Castlegar) is staffed by the Fire Chief and 44 volunteers, who can be summoned very quickly by a recently acquired pager system. Their equipment consists of a 1956 pumper, two fire engines purchased in the mid-60's, a modern 1979 pumper, and two ambulance station wagons. Total pumping capacity is 14,500 liters per minute. The Fire Chief reported that, in general, the pumping capacity is adequate, but it could be inadequate in extreme cases (for example, if the Department's reponse was delayed and a fire had fully engaged a large building before the firefighters arrived). Because new buildings in Castlegar are higher, a new ladder is needed. The number of staff is adequate to cope with present demand. However, one of the Chief's concerns is that a major traffic or train accident on Columbia Avenue would block all north-south traffic and access to the hospital. The Fire Department may require a new fire hall in the future, but the decision will depend on whether City Hall expands into the adjoining part of its building which currently houses the fire hall.

Ambulance services in the Castlegar/Trail area are separate from the Fire Department. Funding is provided by the provincial Ministry of Health, Emergency Health Service.

There are three ambulance units in Trail (two at the hospital, one at the firehall), one unit in Rossland, one in Salmo, and two units in Castlegar. Castlegar also maintains two zone spare cars for use in the event of breakdowns in Trail or Nelson.

Trail has seven full-time attendants and twenty-seven part-time crew while Castlegar has two full-time and about ten part-time. Approval for full-time staff must come from the Ministry but part-time crew are hired locally on an as needed basis.

The annual volume of calls is about 700-800 in Trail and 500 in Castlegar. Both units report that staff and equipment are adequate to handle the present demand. During construction of the Seven Mile Dam, BC Hydro had its own ambulance and attendant so there was no increased demand for Trail services.

The ambulance services also maintain and house emergency equipment funded by the Federal Emergency Health Services.

3.5.2 Social Services

(a) Ministry of Human Resources (MHR)

The MHR regional office is located in Nelson with district offices in Castlegar and Trail. The Trail office services the City of Trail and the outlying areas, including Rossland, Warfield, Genelle, Fruitvale, Montrose, and Casino. The Castlegar office is responsible for Blueberry Creek, Pass Creek, Raspberry, Brilliant, Ootischenia, and Robson. The professional staff of the respective offices are as follows:

TABLE 3-25: MINISTRY OF HUMAN RESOURCES STAFF, APRIL 1981

	Trail	Castlegar
Social Workers	4	2
Family Support Workers	2	2
Finacial Assistance Workers	3	2
Supervisor	1	1

The Social Workers are responsible for family and children's services. They refer cases for special assistance to the family support workers. The various income assistance programs are administered by the financial assistance workers. Both offices regularly see people with psychiatric and alcohol problems, which they are not equipped to treat and for which there are insufficient services in the community.

The average caseload for social workers is about 60 to 70 clients in Trail and about 80 clients in Castlegar. The Trail office feels that this caseload is too heavy and has applied for additional staffing. The caseloads for family support workers (about 15 cases per worker) and financial assistance workers (about 180 cases per worker) are manageable. Decisions on the number of staffing positions are made in Victoria and are based on factors such as population and caseload.

The major problem faced by the Trail MHR office in 1981 was that the tight rental housing market increased demand on the income assistance programs, particularly rental assistance. The supervisor of the MHR office in Castlegar reported that the MHR office is adequately staffed and is not overloaded in any areas.

(b) Children's Services

In Trail, there is one daycare, a Children's Development Centre, and programs offered by the Kootenay Society for Handicapped Children. The Trail and District Day Care Society, a non-profit organization, provides group daycare for children aged 3 to 6 years. The facility is at the Laura T. Morrish Elementary School in East Trail.

The Children's Development Centre is operated by the West Kootenay Cerebral Palsy Association and funded by monthly grants from the Ministry of Human Resources with assistance from the Ministry of Health. The Centre provides speech therapy for children aged 3 to 6 years and physiotherapy for children aged newborn to 16 or 18 years who have physical handicaps. The professional staff is one full-time and one part-time physiotherapist.

In spite of its title, the Kootenay Society for Handicaped Children is concerned with handicapped persons of all ages. It operates employment training workshops and has been promoting general awareness of the need for modified public facilities (parking, washrooms, sidewalk ramps) and employment opportunities for the handicapped.

Services for children in Castlegar are administered by the Kootenay Columbia Child Care Society which has a paid coordinator and a 12 person volunteer Board of Directors. The Infant Development Centre treats up to 40 children, aged birth to 3 years old, who have developmental problems. The Pre-School Development Centre, a continuation of the infant program, works with about 12 children, aged 3 years to school age. The Society also operates a daycare centre for up to 35 children, aged 3 to 6 years. In 1981 there was a waiting list to get into daycare.

(c) Senior Citizens

Both Castlegar and Trail have Senior Citizens Associations which provide a focal point for seniors to find companionship, entertainment, and direction to community resources. The Trail Association of about 280 members is housed in the Cominco Arena and most activities take place there. The Castlegar Association, about 60 members, meets in the Senior Citizens Hall where there are a variety of programs including bingo, card games, dances, and crafts.

Trail also has several residences for senior citizens. The Senior Citizens Villa provides low income accommodation. Golden City Manor is a Senior Citizens Home. The Columbia View Lodge provides personal intermediate care. It has a long waiting list and expansion plans are being considered. The Trail Senior Citizen's Lodge provides personal, long-term care for ambulatory residents. Again, there is a waiting list.

(d) Other Social Services

Trail and Castlegar both have Homemaker Associations which provide support for young families, elderly people and parents of the handicapped. "Meals on Wheels" are provided three times a week to the handicapped and the elderly. Home care services are provided during a mother's absence or inability to perform household tasks. The Associations also provide help for young mothers with new babies.

The Associations are funded by the Provincial Government through the Ministry of Health, the Ministry of Human Resources, and in part by clients.

In 1981 the Trail Association had 80 part-time homemakers giving approximately 5,000 hours of service to 185 clients each month. In 1982 the Castlegar Homemakers Program provided services to about 140 clients per month. Both associations have been requested by the Ministry of Health to reduce the hours of service. There is some concern that this may place additional demand on hospital beds because patients may have to remain longer in the hospital.

A transition house for victims of intra-family abuse opened in Trail in June, 1980. The service is operated by the Women in Need Society (WINS). Approximately 30 women and children from the Castlegar area stayed at the transition house in the past year.

In Castlegar, the Kootenay Society for the Handicapped operates a program called the "Clay Castle", a sheltered workshop for handicapped adults. There are about 20 people involved in the program with 2 paid staff and a number of volunteers. The Society itself is a non-profit organization which provides a variety of services to handicapped persons and their families. Other than the administration of the Clay Castle Program, there is a family support committee which provides in-family services to the handicapped.

The Castlegar Volunteer Exchange attempts to coordinate all social services, recruit and train volunteers, and initiate new programs in response to a perceived need. The coordinator is a paid position and there are about 40 volunteers. On the average about 200 people are directly and indirectly associated with the Volunteer Exchange Programs.

3.5.3 Education

School District No. 11, Trail operates seven schools in the City of Trail: one senior high school, one junior high school, and five elementary schools. In the outlying communities Rossland has two elementary schools and a secondary school and there are elementary schools in Fruitvale, Genelle, Montrose and Warfield.

Student enrollment in the Trail School District has steadily declined since the peak year of enrollment in 1964. Also, since 1965 the proportion of school district students who live in the City of Trail has been declining. These declines (shown in Table 3-26) reflect a societal trend toward lower birth rates and a trend for new residential developments in the outlying areas.

In 1981 the total district enrollment was 4,107. The pupil to teacher ratio was 17.5 overall which compares favourably to the provincial average.

In addition to the public school system, Saint Michael's is a Catholic School in the City of Trail which offers courses up to Grade 7.

School District #9 includes Castlegar and the surrounding rural communities. There are 8 elementary schools in the district, 3 in Castlegar and 1 in each of the following communities: Blueberry Creek, Ootischenia, Raspberry (Pass Creek), Robson, and Tarrys. There are 3 primary schools (kindergarten to Grade 2): 2 in Castlegar and 1 in Shore Acres. The district's two secondary schools are located in Castlegar. In addition, Castlegar has a school for handicapped children and a new program for teenagers with learning difficulties.

As of September, 1981, the school district enrollment was 2621 (see Table 3-27). The 1981 preliminary pupil/teacher

TABLE 3-26: SCHOOL DISTRICT NO. 11, TRAIL, ENROLLMENT, 1961-1981.

Year	City of Trail		Total SD #11
	Number	Percent of Total	
1961	3180	54.7	5811
1962	3254	55.1	5908
1963	3380	55.8	6058
1964	3431	56.2	6102
1965	3502	58.3	6008
1966	3425	57.8	5923
1967	3408	57.5	5923
1968	3379	57.9	5833
1969	3357	57.7	5813
1970	3276	57.3	5714
1971	3131	57.0	5489
1972	2972	56.9	5220
1973	2877	55.1	5221
1974	2803	55.1	5090
1975	2635	52.6	5010
1976	2579	52.7	4897
1977	2506	52.0	4818
1978	2354	51.1	4610
1979	2205	51.6	4276
1980	2192	51.4	4267
1981	2006	48.8	4107

Sources: School District #11, Trail, BC.
Ministry of Education, Data and Information Services Division, February, 1984.

ratio16 for elementary schools was 17.75, for secondary schools, 15.23, and overall it was 16.60. These ratios are comparable with 1981 provincial average pupil/teacher ratios of 17.10 for elementary, 16.02 for secondary, and 16.64 overall.

TABLE 3-27: SCHOOL DISTRICT NO.9, CASTLEGAR, ENROLLMENT 1969-1981

Year	Number
1969	2842
1970	2820
1971	2771
1972	2832
1973	2947
1974	2927
1975	2954
1976	2932
1977	2898
1978	2800
1979	2719
1980	2716
1981	2621

Source: BC Ministry of Education, Data and Information Services, April, 1981; February, 1984.

Post secondary education for the Castlegar/Trail area is provided by Selkirk College located in Brilliant. It offers the first two years of university as well as technical and vocational courses.

3.5.4 Police Protection, Legal and Court Services

a) Police Protection

The Trail RCMP detachment consists of 13 police officers for the City of Trail, 3 for the outlying areas and 12 support staff. The police/population ratio in 1981 was 1/592 and the officer caseload ratio was 1/69.5. As can be seen in Table

3-28 the population/police ratio and the caseload are comparable to other communities of similar size and to the provincial average. The main problems encountered by the Trial RCMP are traffic infractions and alcohol abuse.

The detention facilities consist of one drunk tank and four holding cells. There are no juvenile detention facilities.

The Castlegar RCMP detachment consists of 17 officers, 10 for the City and 7 for the outlying areas. The Staff Sargeant feels that there should be one more officer because the traffic going through Castlegar is becming increasingly heavy. A new detachment building is needed but plans for it have been delayed by financing difficulties. Negotiations with the municipality are continuing.

As indicated by Table 3-28, the population/police ratio in Castlegar is comparable to the provincial average, but the caseload per officer is substantially higher for the municipal area. The 1981 crime rate for the municipality was higher than both BC and Trail.

(b) Legal and Court Services

In the Trail/Castlegar area there is one court in Castlegar which sits about 6 court days/month, and a criminal court in Rossland which is open about 10 court days/month. Two judges serve the communities of Nelson, Castlegar, Salmo, Trail, Grand Forks, Greenwood, Rossland, and Kaslo. The average waiting period is about 3 months in Castlegar and one month in Rossland.

There are two probation officers serving the Trail area and their active caseload is about 50 cases per officer. They report a need for more legal services, especially for alcohol and family problems.

In 1981 there was only one Probation Officer in Castlegar,

TABLE 3-28: CRIME TREND COMPARISONS FOR SELECTED COMMUNITIES AND BRITISH COLUMBIA

		Population 1981	Number of Crimes[1]		% Change	Crime Rate[2] 1981	Police Strength	Population/ Police Ratio	Caseload per Police Officer
			1980	1981					
Castlegar	Rural	3,951	319	268	-16.0	67.84	7	564.4	38.2
	Municipality	6,623	962	1,057	9.9	159.66	10	662.3	105.7
Kimberley	Rural	2,024	131	144	9.9	71.28	3	674.6	48.0
	Municipality	7,093	629	654	4.0	92.24	9	788.1	72.6
Trail	Rural	3,579	130	122	-6.1	34.17	3	1,193.0	40.6
	Municipality	9,465	1,041	1,112	6.8	117.54	16	591.5	69.5
Squamish	Rural	2,050	155	147	-5.2	71.70	8	256.2	18.3
	Municipality	9,182	1,157	1,356	17.2	147.71	16	573.8	84.7
British Columbia		2,642,543		347,457		131.48	4.629[3]	570.8	75.0

Source: BC Police Commission, Data for Jan-Dec '81. BC Police Commission, Bulletin 1981.

[1] "Crimes" are criminal code offenses.

[2] "Crime Rate" is crimes per 1,000 population.

[3] Includes RCMP and Municipal Police.

although a new officer was scheduled to start work in June. The caseload was about 100 people. With the additional Probation Officer, the Castlegar office would be covering a larger area, but the new boundaries had not been defined as of the spring of 1982.

In 1982, a new courthouse was built in Castlegar. It facilitated an expansion of court services to include small claims and family court as well as criminal and juvenile cases.

3.5.5 Organized Recreation

Within the City of Trail there are 14 so called major parks and 19 minor parks. (The designations of "major" and "minor" are based primarily on the size of the parks.) According to the 1978 Land Use Survey, the city has allocated a total of 84 acres of land for parks and recreational facilities.

The Trail Memorial Centre is a multiple purpose building that houses the Cominco Arena, Cominco Gymnasium, Children's Rink, Curling Rink, Municipal Library, Jubilee Room, McIntyre Room, Senior Citizen's Lounge, 2 racquetball courts, a squash court, small gymnasium, studio rooms, and offices of the city's Park and Recreation Commission. It is located in the downtown business district.

Generally the ice rink facilities are used to capacity during prime hours (4 to 11 pm). Between 8 am and 4 pm, however, there are ample opportunities for rink use. The small gymnasium facilities are heavily used and the racquet and squash courts are fully booked in the evenings and heavily booked during the day. The Cominco Gymnasium is used for basketball, tennis, and volleyball, rock concerts, dances, conventions, and meetings for large groups. The ice rink is used for hockey in the winter and roller skating in the summer. The city has made arrangements with the School Board for the use of schools for various programs.

The summer recreation facilities in Warfield include a swimming pool, playgrounds and tennis courts all of which are capable of accepting more participants. The ice rink in Rossland also has ample opportunity for use during the day but it is booked to capacity in the evenings.

The overall picture is one of well equipped recreational facilities with high standards of service and capacity to accommodate some additional participants. The major areas of deficiency are the lack of large sport fields in the City of Trail because of physical land limitations and capital intensive recreational and cultural facilities such as racquet and squash courts, a new library, and possibly an indoor swimming pool. The proposed multi-million dollar complex of the Arts and Cultural Centre under consideration by the Trail and District Community Arts Council would provide substantial improvement in some of the deficient areas.

The major recreation facility in Castlegar is a $1.5 million community complex built in 1976 to replace the old arena. The arena in the new complex seats 1,078 spectators and the capacity can be increased if necessary. The skating rink is used by several hockey leagues, the figure skating club, a broom ball club, and for public skating. While the use is rather moderate during the day, the weekends and evenings are always fully booked. During the summer the rink is used for roller skating.

Inside the complex there is a corridor area known as the concourse, which is used for various community activities such as meetings, rummage sales, and pancake breakfasts. The arts and crafts room is used to capacity.

While there is no gymnasium in the complex, all the school gymnasiums are used every day after 4 pm for community programs, which are filled to capacity. The school gymnasiums are not used on weekends because it is too costly to pay overtime to the maintenance staff.

In addition to the community complex, Castlegar has an outdoor swimming pool which is used to capacity in the summer, but is in need of repair. There is also a squash court and a racquetball court at Selkirk College. They are open to the public only in the evenings and are usually fully booked weeks in advance. The Recreation Department also utilizes all the parks and playfields (two major and 22 minor ones). There are numerous soccer and softball leagues and there is a shortage of playing fields. A community hall with good kitchen facilities is used for large meetings, banquets, and weddings.

The recreation director reports that there is a lack of funds for expansion and improvement of the facilities, although there is a high and increasing demand. Funds are barely adequate for the maintenance of the existing facilities. The facilities most in need of development and expansion were identified as a new library, a youth centre, an indoor swimming pool, a performing arts centre, and new playing fields.

3.5.6 Community Planning

In February, 1980 the City of Trail published an Official Community Plan prepared by an independent consulting firm. In the report, three major planning objectives were established:

(1) the strengthening of the community services, infrastructure, and quality of life;
(2) the accommodation of new urban development;
(3) the redevelopment and re-vitalization of the older areas in the community.

The first objective aims to upgrade the City's recreational and cultural facilities, services and housing to senior citizens, and other municipal services. It is recognized that the City of Trail is the regional commercial-service centre and opportunities for any further strengthening of this position should be seized to develop a more diversified local economic base. The second objective is intended to accommodate the present pressure for urban development, created mainly by Cominco's modernization program. The proposed Murphy Creek project is mentioned as a future cause for more urban development. The third objective calls for the revitalization of older and more decaying areas, principally the Rossland Avenue area in West Trail.

In July, 1977, a Neighbourhood Improvement Program was begun in East Trail and the Riverside Avenue area of West Trail. A total of $760,000 was allocated to be spent over five years. The money is being used to improve parks and recreational facilities. A Residential Rehabilitation Assistance Program began in February, 1979 to provide grants and low interest loans for fixing up homes. A total of $100,000 was allocated to the program and additional money may be available if needed. The growth-oriented nature of the Community Plan seems to reflect the community's awareness of the importance of continued development and its related problems.

The City of Castlegar has as part of its planning a "downtown revitalization program" which is aimed at the redevelopment of the old downtown area along the north end of Columbia Avenue. It includes 8-9 blocks along Columbia Avenue, from 2nd Street to 9th Street and the old arena. This is a high density residential area, the business sector of which is at present threatened by the development of shopping plazas along the south end of Columbia Avenue. The major worry is that if the business sector continues to decline as a result of the plaza development, the old downtown area would become a "ghost town". The downtown revitalization program is to be used as a measure to stop and reverse this trend.

An integral part of the program is to have more high density development such as apartment blocks with office space. This is to induce businesses to stay in the core downtown areas and to encourage new businesses to move in. Since the core downtown area is within walking distance for most of the residents of Castlegar North, there is substantial "walking traffic" in the area. In the long term, the city hopes to replace the existing ferry, which links Columbia Avenue with Robson, with a bridge. This will in turn increase the traffic flow through the downtown area. The program also relies on the development of the land along the river bank into parks and possibly a marina.

3.6 Community Cohesion

Community cohesion refers to the amount and quality of social relations and interactions in a community and to the attraction to and identification with a particular community. Community cohesion is an important factor in assessing the social impacts of projects such as Keenleyside-Murphy. These projects have the potential to negatively affect community cohesion by reducing the attractiveness of the environment and interfering with the provision of the material, social, and psychological needs of individuals.17

In this study community cohesion was assessed on the basis of five factors:

- satisfaction with local services and facilities,
- perceived quality of the physical and social environment,
- attachment to the neighbourhood and area,
- effectiveness of political organization, and
- the extent of social problems.

Information on the first three factors was obtained from the 254 household interviews in the study area conducted in April, 1981. (The methodology for this survey is described in Appendix F.) The households interviewed were located in Robson, Raspberry, Brilliant/Ootischenia, Castlegar North, Castlegar South, Blueberry/Fairview, Genelle, Oasis, Rivervale and Trail. Most of the households interviewed were single family houses (76%) and were owner occupied (85%). Table 3-29 shows the type of dwelling for the households interviewed. Most of the mobile homes included in the survey were located at Genelle.

TABLE 3-29: TYPE OF DWELLING FOR HOUSEHOLDS INTERVIEWED

	Number	Percent
Single House	194	76.4
Duplex	1	0.4
Row House	7	2.8
Apartment	11	4.3
House Att Nonres1	2	0.8
Mobile Home	33	13.0
Other	6	2.4
Total	254	100.0

1 House attached to a non-residence.

The average household size was 2.7 people. The respondents were aged 15 years to over 65 years, with about 46% men and 54% women. Table 3-30 shows the age sex distribution of the residents in the households surveyed. It is very similar to the population age distribution of the Castlegar/Trail area.

Most of the respondents (81%) were married; 15% were divorced, widowed, or separated; and 5% were single. The most frequently stated occupation of the adults living in the households interviewed was processing, which includes mineral ore treatment and cellulose pulp preparation, followed by managerial/administration and clerical.

As illustrated in Table 3-31, most of the households interviewed were either "extremely satisfied" or "satisfied" with services and facilities in the area, with the physical environment, and with the social environment. The only areas

TABLE 3-30: AGE AND SEX DISTRIBUTION OF RESIDENTS IN HOUSEHOLDS SURVEYED

	Male		Female		Total	
	No.	% of Total	No.	% of Total	No.	% of Total
0-4	40	11.5	31	8.9	71	10.2
5-14	38	10.9	53	15.1	91	13.0
15-34	114	32.7	108	30.9	222	31.8
35-64	128	36.7	127	36.3	255	36.4
65+	29	8.3	31	8.9	60	8.6
Total	349	100.0	350	100.0	699	100.0

TABLE 3-31: SATISFACTION WITH SERVICES, PHYSICAL ENVIRONMENT, AND SOCIAL ENVIRONMENT

	Households "Satisfied" or "Extremely Satisfied" (%)
Services:	
Housing	87
Availability of Services	86
Education	82
Organized Recreation	80
Physical Environment:	
Physical Setting	96
Outdoor Recreation	87
Social Environment:	
Safety of the Community	91
Friends and Relatives	91
Amount of Noise	88
Job Opportunities	64

where there appeared to be problems were in organized recreation and job opportunities. Since the employment situation has worsened since 1981, it is likely that dissatisfaction with job opportunities is much higher than when the survey was completed.

Factors used to assess the attachment of individuals to their neighbourhood and area were: satisfaction with the neighbourhood, social ties in the neighbourhood and community, length of residency, reasons for moving to the area, and the desire to stay or move. When asked to rate satisfaction with "this neighbourhood as a place to live", 98% of the respondents reported they were "extremely satisfied" or "satisfied." Other surveys in BC towns have asked residents about their area as a place to live. (This is a somewhat different question than asking about the neighbourhood.) In Chetwynd, Cache Creek, Ashcroft, and Lillooet, 42.7% to 75.6% of the people interviewed rated their area as good or excellent. (See Table 3-32.) Our conclusion is that people in the Castlegar/Trail area view their neighbourhoods very positively.

The study area households reported having strong social ties to their neighbourhood and community. For a high proportion of households (84%) most of their friends live in the neighbourhood or community. Fifty-eight percent of the respondents reported that most of their relatives live in the area. About 50% of the households do not belong to any groups, but the remaining households are active in from 1 to 8 organizations.

The information on reasons for moving to the area, length of residency, and plans for staying in the area is indicative of a strong attachment to the community. The most frequently stated reason for moving to the area was "a job", followed by "born or grew up here", and "like the countryside." As long as there are jobs, people definitely prefer to stay in the area. About two-thirds of the respondents plan to live on

TABLE 3-32: COMPARISON OF AREA RATING BY RESIDENTS IN FOUR BC TOWNS[1] WITH CASTLEGAR/TRAIL NEIGHBOURHOOD RATINGS.[2]

Rating of Area as a place to live	Chetwynd (n=204)	Cache Creek (n=101)	Ashcroft (n=87)	Lillooet (n=37)	Rating of Neighbourhood As a Place To Live	Castlegar/ Trail (n=254)
		(%)			(%)	
Excellent	10.3	27.7	21.8	32.4	Ex. Satisfied	61.8
Good	32.4	41.6	44.8	43.2	Satisfied	35.7
Average	38.7	24.7	25.4	8.2	Neutral	0.8
Below Average	13.7	3.0	2.3	10.8	Dissatisfied	1.2
Poor	4.9	3.0	5.7	5.4	Ex. Dissatisfied	0.4
	100.0	100.0	100.0	100.0		100.0

Sources: [1] P. Eby & Associates. Social and Economic Effects of the Grizzly Valley Pipeline and Gasplant Construction on the Chetwynd Region, BC Westcoast Transmission Company Limited. January, 1979.

[2] DPA Consulting Limited, Household Survey, 1981.

their property permanently, and about half have lived in the area more than 16 years. (See Table 3-33.) When asked, "What might cause you to move from the neighbourhood?", a majority of the people replied, "Nothing."

Thus, as indicated by satisfaction with their neighbourhood, social ties, length of residency and desire to stay, people in the Trail/Castlegar area are very attached to their communities. Furthermore, they are satisfied with the local services and facilities and view the quality of the physical and social environment as high. In other words, they live here because they choose to, they like it here, and they plan to stay.

Political effectiveness in a community refers to its ability to respond in an organized and effective way to events or agents which could change the community. It is an indication of community cohesion because it requires, first, that objectives for the community be shared by its members, and second, that members can be readily mobilized to take collective action.18 The residents of the Castlegar area have demonstrated their political effectiveness by the formation and subsequent activities of the Castlegar Economic Development Committee. The Committee developed out of a public meeting held in January, 1982, to discuss what the community could do about the evident downward trend in the local economy. Since its inception, the Committee has established short-term and long-term economic development goals for the Castlegar area. Its short-term goals include encouraging a dialogue between the community and the major employers in the area such as BC Timber, Cominco, and BC Hydro to ensure that the public and the companies are fully aware of each other's concerns.

Another of the Committee's activities is directly relevant to the present study. The Committee sponsored a petition to the Minister of Energy, Mines, and Petroleum Resources requesting that the installation of generating facilities at the

TABLE 3-33: LENGTH OF RESIDENCY IN THE AREA, LENGTH OF RESIDENCY ON PRESENT PROPERTY, AND PLANNED RESIDENCY

	Residency in the Area		Residency on Present Property		Planned Residency	
Years	Number	Cumulative %	Number	Cumulative %	Number	Percent
5	50	19.7	104	40.9	48	18.9
6-10	31	31.9	41	57.0	11	4.3
11-15	26	42.1	28	68.1	1	0.4
16-20	24	51.6	23	77.2	5	2.0
21-30	40	67.3	26	87.6	-	-
31-40	48	86.2	25	97.6	-	-
41-50	20	94.1	6	99.6	-	-
51-60	6	96.5	1	100.0	-	-
61-70	9	100.0	-	-	-	-
Permanently	NA*		NA		176	69.3
Don't Know	NA		NA		13	5.1
Totals	254		254		254	

---

*NA is "not applicable".

Keenleyside dam begin as soon as possible so that jobs in the local area would be created. The petition was signed by 2,683 people.

The Trail area has demonstrated a similar level of political effectiveness, particularly in dealing with large scale hydroelectric projects. The Project Impact Committee (PIC) was formed to represent the community's interest to BC Hydro during construction of the Seven Mile Project. According to the committee members, they were effective in ensuring that the project would have no severe negative impacts on the social, economic, and physical environment of the area. The PIC has continued to represent community interests in relation to the Keenleyside-Murphy Project.

The final component of community cohesion assessed in this study was the extent of social problems. The representatives of community services and other local officials who were interviewed reported no outstanding social problems in the study area. The local residents indicated that problems such as alcohol and drug abuse, juvenile delinquency, and family violence did exist, but they were no more severe than in most communities.

To summarize, the study area can be described as one where residents place a high value on the physical and social environment, where residents are satisfied with available services and facilities, and where residents are prepared to work together to maintain their quality of life.

FOOTNOTES

1. BC Ministry of Agriculture. Agriculture Statistics Yearbook, 1978.

2. Statistics Canada, 1981 Census of Agriculture.

3. BC Ministry of Economic Development. British Columbia Regional Index, 1978.

4. BC Ministry of Forests, Nelson Forest Region. Arrow Timber Supply Area Yield Analysis Report, May 1981. Boundary Timber Supply Area Yield Analysis Report, March 1981. Kootenay Lake Timber Supply Area Yield Analysis, December 1980.

5. Regional District of Central Kootenay. Economic Study: Arrow Lakes Regional Plan, 1979.

6. BC Ministry of Mines and Petroleum Resources, Annual Reports, 1971-1978.

7. Ibid.

8. Cominco. Annual Report 1980 and 1981.

9. Castlegar News Supplement. Recreation, Business, and Industrial Review. March 1981.

10. Jim Switzer, Manager Canada Employment Centre, Trail, personal communication.

11. BC Research. British Columbia Tourism Model, 1979. Travel Industry Outlook as of December, 1978.

12. Transportation, trade, finance, insurance, real estate, public administration, and other services.

13. Pacific Hydrology Consultants Ltd. Murphy Creek Project Preliminary Design Groundwater Studies. August, 1982.

14. Kerr Wood Leidal Associates Ltd. British Columbia Hydro and Power Authority. Phase I Study, Impact of the Murphy Creek Hydroelectric Dam on Municipal Services in the Castlegar Region. February, 1981.

15. This information was obtained from:
    - Ministry of Lands, Parks, and Housing. Housing Quarterly Lower Mainland, Capital Region, and Nelson/Castlegar Housing Market Analysis. Second Quarter 1981, September 1981.
    - Urban Systems Ltd., Murphy Creek Hydroelectric Development, Land Use Study, Final Draft Report, November, 1981.

- Urban Systems Ltd., Keenleyside Power Project, Land Use Study, First Draft Report, May, 1982.
- Kerr Wood Leidal Associates Ltd., Murphy Creek Hydro-electric Project, Downstream Water Use Study, October, 1981.

16. BC Ministry of Education, Statistical Services, May 1982.

17. Finsterbusch, Kurt. Understanding Social Impacts, Sage Publications Inc., California, 1980 (p. 78).

18. Bowles, Roy T. Social Impact Assessment in Small Communities, Butterworth & Co. (Canada) Ltd., Toronto, 1981.

4.0 OVERVIEW OF FUTURE SOCIOECONOMIC CONDITIONS

The purpose of this section is to present economic and demographic projections for the Castlegar/Trail area under the assumption that the Keenleyside-Murphy Project does not proceed. The techniques used to prepare these "without the project" or base case forecasts are further explained in Appendix D. This appendix also summarizes the expected trends in the province as a whole.

4.1 Population Projections

Three methods are available for predicting population. The easiest method is based on historical trends, but is only valid if economic and social conditions can be expected to remain constant over both the projection period and the historic reference period.

A more sophisticated approach to population projection uses cohort component survival to project individual age groups. This method provides a powerful tool for projecting the natural rate of increase and relative change among age groups, but requires assumptions about migration to and from the study area. The method is most reliable when migration is a small proportion of total population change or when it can be expected to hold constant over the projection period. Neither assumption can be made for the Castlegar/Trail area. However, the cohort survival projections prepared by BC Research have been useful in examining the future age structure of the population.

The third method, and the one we have used in this study, bases population projections on projected employment. Since the employment projections have been prepared specifically for the study area, the method should have a high degree of reliability in the short term. However, since employment in the Castlegar/Trail area is highly concentrated, with 75% in the BC Timber and Cominco plants, major decisions by these firms or the arrival of a new large employer could have dramatic effects on employment and the population supported.

The population projection given here is based on the assumption that population is directly dependent on employment. If there are more jobs, more people can be supported; if there are fewer jobs, net migration out of the region occurs. This is consistent with the recent history of the area. People have moved into the region in response to opportunities for work on major construction projects or other jobs, and left when there were major employment cutbacks. In addition, there has been a long-term out-migration since the economy has grown more slowly than the rate of natural increase.

Table 4-1 illustrates the key relationships in the population projection. It begins with employment, which is discussed in detail in a subsequent section.

TABLE 4-1: EMPLOYMENT AND POPULATION RELATIONSHIPS CASTLEGAR/TRAIL AREA, 1981-2001 (WITHOUT THE PROJECT)

	1981	1986	1991	1996	2001	Average Annual Increase (%) 1981-2001
Employment (#)	15,500	15,600	16,800	17,800	19,100	1.0
Unemployed (#)	1,200	2,300	2,100	1,900	1,700	-
Unemployment Rate (%)	7.2	13.0	11.3	9.6	8.0	-
Labour Force (#)	16,700	17,900	18,900	19,700	20,800	1.1
Participation Rate (%)[1]	61.1	62.3	63.5	64.7	65.5	-
Working Age Population	27,200	28,[illegible]	29,800	30,400	31,700	0.8
Total Population	35,400	37,[illegible]	38,500	38,800	39,700	0.6

[1] Based on working age population (pe[illegible] 15 years and over)

Source: 1981 figures from Table 3-10.

Employment is related to total labour force size by the unemployment rate. As described in Table 3-10, the unemployment rate in the Castlegar/Trail area was significantly above the provincial average in 1981. More recent information on labour force utilization is not available for the Castlegar/Trail area. However, information from the Labour force Survey[1] for Economic Region 92 (the Kootenay-Columbia Region which goes up to Revelstoke) can be used to identify possible unemployment rate trends for the study area (which constitutes perhaps 40% of Economic Region 92 in terms of population, labour force, etc.).

Consistent with province-wide trends, the unemployment rate in Economic Region 92 nearly doubled from 7.6% in June 1981 (the month of the 1981 Census) to 13.9% in June 1983. In terms of annual averages, the increase was from 10.8% in 1981 to 16.6% in 1983. The latest month available from the Labour Force Survey is February 1984. In that month, the seasonally adjusted unemployment rate in Economic Region 92 was 23.5% compared with 8.6% three years earlier.

In the case of the study area, it is assumed that the increase in the unemployment rate was in line with trends in the broader region. This would suggest an unemployment rate of better than 13% in June 1983 and an average rate of unemployment in excess of 15% through the full year. Because of the slow growth in employment as a consequence of the labour force reductions at Cominco, the unemployment rate in the study area is expected to remain around 13% to 1986 and above 10% until at least 1994, the end of the construction period.

The labour force is related to the working age population by means of the labour force participation rate. From June 1981 to June 1983, the participation rate in Economic Region 92 declined marginally from 63.2% to 62.1%. A similar trend is anticipated for the study area. It is projected that the rate of labour force particiaption in the study area will return to the 1981 level by 1984 or 1985 and then increase slowly through to 2001. As of 1981, the participation rate in the Castlegar/Trail area was significantly below the provincial average. This gap is expected to widen over the projection period, the result of the more modest growth in employment projected for the study area compared to province-wide trends.

Finally, the total population is computed from the working age population based on projected changes in the structure of the study area population. These are provided by the most recent population projections by school district, produced by BC Research; these projections use 1981 Census as a benchmark. Table 4-2 offers the projections of the age structure of the Castlegar/Trail area population.

TABLE 4-2: HISTORICAL & PROJECTED POPULATION STRUCTURE: CASTLEGAR/ TRAIL AREA, 1981-2001

	Proportion of Total Population (%)				
Age (Years)	1981	1986	1991	1996	2001
0-14	22.2	22.5	22.6	21.6	20.1
15-39	41.3	41.5	39.8	37.7	36.4
40-64	25.8	24.9	26.5	28.9	32.2
65+	11.0	11.1	11.1	11.8	11.3
Total	100.0	100.0	100.0	100.0	100.0

Source: 1981: Statistics Canada Census 1981.
1984-2001: Estimated from BC Research, British Columbia Population Projections.

Age (Years)	1981	1986	1991	1996	2001
0-14	7,850	8,350	8,700	8,380	7,980
15-39	14,560	15,400	15,330	14,630	14,450
40-64	9,135	9,240	10,200	11,210	12,780
65+	3,900	4,120	4,270	4,580	4,490
Total	35,440	37,100	38,500	38,500	39,700

Source: Economic Base Projection. Tables 4-1 and 4-2.

Table 4-1 indicates that in the absence of the Keenleyside-Murphy Project, total employment in the study area will show only modest growth over the next two decades, and population will display an even lower rate of growth. Over the total 20 year period, population will advance at an average rate, compounded annually, of 0.6% per year. In contrast, the population projections of BC Research for the total province show an increase on the order of 2.2% per annum over the next 20 years.

The population projections based on this method can be compared with the BC Research projections based on a cohort component survival model and the assumption that 1976-81 migration will continue for much of the projection period, especially after 1986.[2]

	DPA	BC Research
1981	35,400	35,400
1986	37,100	35,100
1991	38,500	36,700
1996	38,800	40,000
2001	39,700	44,000
Average Annual Growth Rate	0.6%	1.1%

BC Research projects a modest decline in population from 1981 to 1986, apparently under the assumption that many study area residents will leave the area in search of employment elsewhere in the province. DPA projections imply a greater tendency to stay in the study area because the high unemployment in the area will be comparable to many other regions of British Columbia -- despite high unemployment, there will not be a great deal of incentive to migrate in the hope of finding work elsewhere. After 1986, BC Research projects a strong expansion in the study area's population, in line with the improved economic fortunes of the total province. In contrast, DPA projections imply an increase in net migration out of the study area after 1986, as employment opportunities become available in other parts of British Columbia (and, perhaps, in other parts of Canada).

The distribution of the projected population within the study area is impossible to predict with accuracy. Recent trends provide a guide, but numerous dynamic factors will influence the distribution. The location of employment opportunities will be one significant determinant. The availability of suitable housing and serviced land are currently important constraints on location choice and will continue to be a major influence in the future. For analytical purposes, an estimate of future population distribution using available data is presented in Table 4-3.

The figures in Table 4-3 are based on the assumption that the changes in population share experienced by the major centres between 1971 and 1981 (see Table 3-3) will continue in terms of overall direction, but the rate of change will be sharply reduced. This assumption further implies that the population shares of the more rural areas, which increased fairly significantly from 1971 to 1981, will not change over the next 20 years. Since the study area's total population will increase slowly over the next 20 years, the pressures which have led to new rural housing construction in the past should subside significantly. Although the figures in Table 4-3 are broadly consistent with the recent past and with the employment projections that follow, the reader is cautioned that they provide only a guide to the future and significant deviations may be expected.

Table 4-4 provides projections of the number of households in the study area based on forecasts of the number of persons per private dwelling provided in Appendix D. Despite the slow growth in population, the number of households in the study area, and in all communities within the study area, is projected to increase quite significantly over the 20 year period. This reflects the view that the number of people per household will continue to decline, albeit at a decelerating rate, through the projection period.

TABLE 4-3: HISTORICAL & PROJECTED POPULATION DISTRIBUTION, CASTLEGAR/TRAIL AREA, 1981-2001

Community	Share of[1] Population (1981)%	Share of Population 2001(%)	Population				
			1981[2]	1986	1991	1996	2001
Trail	27.1	25.0	9599	9830	10010	9890	9920
Castlegar	19.5	21.4	6902	7420	7890	8150	8500
Rossland	11.2	11.0	3967	4150	4270	4310	4370
Fruitvale	5.4	6.0	1904	2040	2160	2250	2380
Montrose	3.5	3.5	1229	1300	1350	1360	1390
Warfield	5.6	5.2	1969	2040	2080	2060	2060
Rural (Trail) SD #11	12.1	12.1	4272	4490	4660	4690	4800
Rural (Castlegar) SD #9	15.8	15.8	5598	5860	6080	6130	6270
TOTAL[3]	100.0	100.0	35440	37100	38500	38800	39700
Natural Increase[4]				1660	1700	1400	1100
NET MIGRATION				--	(300)	(1100)	(200)
TOTAL CHANGE				1660	1400	300	900

Source: [1] Table 3-3.

[2] Table 3-2.

[3] Table 4-2.

[4] Based on natural rates of increase for the 2 school districts indicated in the BC Research projections.

TABLE 4-4: "WITHOUT THE PROJECT" HISTORICAL & PROJECTED NUMBER OF HOUSEHOLDS, 1981-2001

	1981	1986	1991	1996	2001
Total Study Area	12,610	14,050	15,040	15,520	16,070
Trail	3,730	4,090	4,280	4,350	4,440
Castlegar	2,400	2,730	3,000	3,170	3,350
Rossland	1,400	1,580	1,690	1,740	1,790
Fruitvale	650	720	790	840	900
Montrose	380	430	460	470	490
Warfield	730	810	860	870	880
Rural (Trail) SD#11	1,380	1,540	1,650	1,690	1,750
Rural (Castlegar) SD#9	1,930	2,150	2,310	2,390	2,470

Source: Statistics Canada Census, 1981; Table 4-3; and Appendix D.

However, the growth in the number of households, averaging 1.2% per annum, is below the 2% per year growth displayed between 1971 and 1981. This may indicate that the study area's housing industry will encounter few problems in supplying the new housing requirements. Indications are that the firms involved in residential construction are currently operating below capacity.

Since a modest population increase is projected without the Keenleyside-Murphy Project, the supply of infrastructure, government services, etc. in the area may not be a problem. However, planning decisions with regard to the location of roads and services could still have an effect on the future population distribution. This is particularly true for rural settlements such as Robson, Ootischenia, and Blueberry which require water and sewer service improvements if population expansion is to occur. Trail will remain the major service centre in the study area, but Castlegar and Rossland could expand their service roles at the expense of Trail.

4.2 Economic and Income Growth and Distribution

The preceding demographic analysis is based on sector by sector projections of likely economic activity described below. The economic projections are summarized in Tables 4-5 (Employment), 4-6 (Value of Production), and 4-7 (Personal Income).

4.2.1 Agriculture

No significant changes are forecast for this sector during the projection period. Employment may decline slightly from its present level, but production and income are expected to remain more or less constant. Employment will be about 3% of the area's employed labour force, but agriculture will continued to account for a marginal proportion of the value of production in the study area.

4.2.2 Mining

The only operating metal mines within the Castlegar/Trail area are very small. Most current mineral production consists of aggregate extraction for construction purposes. Future mining development will depend on local demand for construction aggregates and on world prices for metals. No significant changes are forecast in the short term. The most likely prospects in the region are located outside the study area, near Greenwood, Nakusp, and Slocan. However, in the medium term, with favourable markets, there is some prospect of a new mine being developed on claims near Rossland. The projection scenario includes a medium-sized mine (200 employees) developed in the late 1980's. This is consistent with the scenario developed by the Regional District of Kootenay Boundary.[3]

4.2.3 Forestry and Wood Products

Future expansion is limited by the suitable yield of the

TABLE 4-5: HISTORICAL AND PROJECTED EMPLOYMENT BY INDUSTRY, CASTLEGAR/TRAIL AREA WITHOUT KEENLEYSIDE-MURPHY PROJECT

	1981	1986	1991	1996	2001	Av.Annual Increase 1981-2001 (%)
Basic Industry						
Agriculture	600	600	600	600	600	0.0
Forestry, Fishing, Mines	200	200	400	400	400	3.5
Manufacturing (Export)	2600	2300	2300	2300	2300	0.0
Travel Industry (Trade)	300	380	460	540	660	4.0
(Service)	1300	1620	2040	2360	2840	4.0
Sub-Total	5000	5100	5600	6000	6600	1.4
Non-Basic Industry						
Manufacturing (Local)	100	100	110	120	130	1.3
Construction	1500	1400	1550	1580	1600	0.3
Transportation/ Communications	1300	1300	1350	1410	1500	0.7
Trade	2500	2300	2300	2320	2340	-0.3
Finance/Real Estate	800	880	970	1070	1190	2.0
Service	3200	3420	3720	4000	4340	1.5
Public Admin.	1100	1100	1200	1300	1400	1.2
Sub-Total	10500	10500	11200	11800	12500	0.9
Total	15500	15600	16800	17800	19100	1.0

Source: Based on sectoral analysis. Refer to text for details of each industry.

TABLE 4-6: HISTORICAL & PROJECTED VALUE OF PRODUCTION BY INDUSTRIAL SECTOR, CASTLEGAR/TRAIL AREA WITHOUT KEENLEYSIDE-MURPHY PROJECT

	(in $1980 millions)				
	1981	1986	1991	1996	2001
Agriculture	0.3	0.3	0.3	0.4	0.4
Mining	0.9	1.0	30.0	50.0	54.0
Forestry & Wood Products	191.0	209.0	228.0	246.0	265.0
Primary Metals	518.0	645.0	700.0	750.0	810.0
Other Manufacturing	36.0	40.0	45.0	51.0	57.0
Travel Industry	27.0	35.0	45.0	59.0	76.0
All Other Industries (Non-Basic)	390.0	431.0	475.0	525.0	580.0
Total: All Industries	1163.2	1361.3	1523.3	1681.4	1842.2

Note: Based on projected increases over 1980 production. All values estimated in 1980 dollars. No allowance has been made for future price inflation, but some allowance is made for productivity increases and increases in real prices (over and above the general rate of inflation). The growth in the value of production per employee is estimated as follows:

	Annual Average Increase (%)
Agriculture	1.5
Mining	1.5
Forestry & Wood Products	1.5
Primary Metals	1.5
Other Manufacturing	1.0
Travel Industry	1.3
All Other Industries	1.1

These growth rates are based on historical trends and expected industry trends in the province as a whole.

1980 is used as the base year in these projections. Because of strikes in the forestry industry and weak metal prices, 1981 is not a "typical" year.

TABLE 4-7: HISTORICAL AND PROJECTED PERSONAL INCOME: CASTLEGAR/TRAIL AREA WITHOUT THE KEENLEYSIDE-MURPHY PROJECT, 1980-2001

	Employment Income ($1980 000s)				
	1980	1986	1991	1996	2001
Agriculture	100	110	120	130	130
Mining	300	400	24400	30500	32900
Forestry	5000	5500	6000	6400	6900
Wood Products	28000	31000	33000	36000	39000
Primary Metals	95000	87000	87000	101000	109000
Other Manufacturing	5900	6500	7200	8100	9100
Tourism	10400	13800	18400	22700	29200
All Other Sectors	128000	135000	152000	169000	189000
Total Employment Income ($000)	273000	280000	335000	374000	415000
Total Personal Income ($000)	357000	366000	438000	489000	543000
Employment Income Per Employee ($000)	17600	17900	19900	21000	21700
Personal Income Per Capita ($)	10300	9900	11400	12600	13700
--% of Total Province	93.5	90.0	92.7	92.6	91.3

Source: Estimated from projected employment, Tables 4-1 and 4-5, demographic characteristics Tables 4-2 and 4-3, and average earnings by industry. Statistics Canada 72-002, 72-005, and 72-008.

Note: The projections are in constant 1980 dollars and, therefore, take no account of the general rate of inflation. However, the projections do incorporate expected growth in labour productivity and real wages. Growth in real wages by sector is generally consistent with the growth in value of production per employee as described in Table 4-6.

timber resource. The BC Forest Service estimates that the Boundary Timber Supply Area harvest level can be increased by 17% within the forecast period, and that within the next 20 years, no significant expansion can take place within the Kootenay Lake TSA.[4] The Arrow TSA may be overcommitted already.[5] Prospects for increased production depend on increased utilization of small diameter wood which would require new equipment in most existing mills. The remaining prospect for expansion is in the pulp sector.

For the present projection it has been assumed that sawmills within the study area can secure timber to increase output by 10% over the next ten years. However, this output increase is offset by productivity gains, resulting in stable employment in the sawmill industry.

BC Timber has several options under consideration for increasing the capacity of the pulp mill at Castlegar. Expansion could involve establishing a second production line or replacing the existing mill to double the present capacity. Either project would involve expenditures in excess of $250 million. However, the long term employment impact is unclear. A second production line could mean up to 200 new jobs. A new mill could require less manpower than the existing mill.[6] Expansion depends on a number of factors including costs of meeting pollution control requirements, security of chip supply, market conditions, and coordination with other BC Timber operations. Because of these uncertainties, this project has not been included in the economic scenarios. Although the long term employment impact is unclear, the mill expansion would definitely be a major construction project, involving at least several hundreds of person-years of labour. Depending on its timing, the project could potentially compete for workers on the Cominco or Keenleyside-Murphy Projects, or it could be complementary, and contribute to stability in the local construction industry.

4.2.4 Primary Metals

Cominco is presently engaged in a major expansion of its smelter at Trail. In excess of $700 million is being spent over the 1977 to 1983 period, mostly at Trail. The construction work force is being employed directly by Cominco. Present employment has increased from a low of 3,600 in 1976 to 4,725 in April, 1981. Since the company faces a high rate of retirement from its older workers in the next few years, it plans to retain a substantial number of the construction workers after the expansion is complete. The work force is expected to decline through attrition to stable operational levels between 3,800 and 4,000 in 1987.[7]

The expansion will increase zinc production capacity by 10% and lead production by 25%. It is projected that at 1980 price levels, the total value of production at Trail will exceed $600 million annually. The reduction in labour force and the expansion of Cominco production are the most significant events included in the economic baseline projection. Although there is not likely to be any major increase in unemployment since the labour force reduction will be through normal attrition, the loss of payroll will be felt by area businesses. The expansion of capacity will maintain Cominco's strength as the largest base industry in the region with over two-thirds of the value of industrial production.

In projecting export based manufacturing employment to area residents, it is assumed that employment declines at Cominco will be partially offset by small increases in forest products and other export oriented manufacturing industries.

4.2.5 Other Manufacturing

Most other manufacturing in the Castelgar/Trail area produces for the local market and can be expected to expand in proportion to other activity in the area. As shown in Table

4-5 this is estimated at 30 additional jobs by 2001.

4.2.6 Travel Industry

In 1981, the accommodation sector in Castlegar and Trail was buoyant. A new hotel had opened in Rossland, a major expansion had been completed in Castlegar, and a Trail hotel was undergoing major renovations.[8] Three other hotel or motel projects with 230 rooms were planned or proposed for Castlegar.[9]

The Regional District of Kootenay Boundary expects further development of the same type associated with Rossland ski development by 1990.[10]

Reliable forecasts of travel industry growth are not available for the area. However, informed respondents agree that it is a potential growth sector. It is projected that the Castlegar/Trail area will experience travel industry growth consistent with recent trends in the province as a whole. Accordingly, travel industry revenues are projected to increase by a little less than 6% per annum over the 20 year period, while growth in employment is anticipated to be 4.0% per year. This results in an increase of 1,900 jobs and nearly $70 million in gross annual revenue over the next 20 years.

In the short term, planned construction may result in excess capacity in the accommodation sector. For 1986 and 1991, employment in the accommodation sector has been increased above the projected 4.0% trend. Employment in related services and revenues for the industry are projected at the trend rate.

4.2.7 Construction

Baseline construction employment is difficult to project reliably. This is due, in part, to uncertainty about future projects in the area, such as the possible BC Timber expansion. In addition, a large proportion of construction workers are mobile. Resident tradespeople work on jobs outside the area when there is little work close to home, and non-residents come in when there is extra work available. The projection is based on a review of known projects, a review of the recent construction performance in the region, and interviews with labour and government manpower representatives.

Current construction work in the Castlegar/Trail area is estimated to support up to 550 workers based on housing starts, highway maintenance, and a somewhat elevated level of commercial building activity. This level is expected to drop once the Cominco expansion is complete because the demand for new housing and commercial development will drop. This area will pick up again, following the rest of the local economy, after 1986. Employment is projected to increase by about 150 from 1986 to 1991, and experience more modest gains thereafter, in line with overall economic trends.

In addition to local demand, a substantial number of construction tradespeople resident in the area rely on outside employment. Most are committed to residence in the Castlegar/Trail area and return when there is local work available. Interviews with local union representatives indicate a substantial number of tradespeople employed outside the area and others in the area unemployed. There are about 250 members of the Carpenters Union in the Castlegar and Nelson locals. Of these, approximately 50 were available for work recently, and the majority of those working were on projects outside the area.[11] The Ironworkers Union reported 450 members in the West Kootenays and about 160 available for work.[12] Most of those employed are working on mining projects in the East Kootenays or at the Revelstoke Dam. These two examples suggest that at least 200 resident construction workers are employed outside the area, and perhaps a similar number are available for work. It is expected that many of the outside workers would return if local work were available.

Workers on the Cominco expansion are not included in the construction labour force estimates since they are employed directly by Cominco and are members of the Steelworkers Union. Many will be retained as permanent employees. Others come from outside the area and may leave again on completion of the project. The available information indicates that there is little interaction between the local building trades labour pool and workers on the Cominco expansion.

4.2.8 Transportation, Utilities, Trade, and Service Sectors

All other sectors are dependent on the basic industries. The present ratio of total employment to basic industry employment is estimated at 3.10.[13] Construction and locally oriented manufacturing are included in the non-basic sector. The basic-to-total ratio implies two jobs in the service or "residentiary" sector for every one in basic industry. The projection is based on a modest decline in this ratio, reflecting the further development of Cranbrook as the major service center in the Kootenays. Within the total non-basic employment, the distribution among sectors (except construction and local manufacturing) is projected to change in line with 1971-1981 trends. Therefore, the activities projected to display the strongest economic gains are Finance, Insurance and Real Estate, Public Administration and Community, Businesses and Personal Services. In contrast, a small absolute decline is projected for the Trade sector, reflecting the limited growth in the Castlegar/Trail area population and the growing role of Cranbrook. The total value of sales and production in all non-basic industries in the area is estimated at $390 million, rising to $580 million in 2001. Thus, the non-basic sector accounts for two-thirds of all employment, and about 30% of the total value of production. Community, Business, and Personal Services is the largest service sector, with employment of 3,200 in 1981, rising to 4,340 by the end of the projection period.

4.2.9 Personal Income

Current average earnings for each major industry -- adjusted for expected changes in labour productivity and real wages -- have been applied to the employment estimates to calculate employment income and personal income as shown in Table 4-7. Income from sources other than employment has been estimated from income tax returns. In 1977 non-employment income amounted to 25% of employment income[14] in the Trail/Rossland area. Major components of this include Unemployment Insurance benefits and pension income. This ratio was adjusted to reflect recent changes in the unemployment rate and the increasing proportion of senior citizens over the projection period. Employment income per employee is projected to increase by about 1.2% per year (compounded annually) in response to expected changes in labour productivity and real wages (as described in the notes to Tables 4-6 and 4-7). This is consistent with anticipated changes at the provincial level. These projections result in average growth in total employment income and total personal income of 2.0% per year between 1980 and 2001.

Personal income per capita is expected to expand at an annual average rate of 1.4% per year over the full projection period. The projections suggest that personal income per capita will continue to be 7-10 percentage points below the provincial average over the next 2 decades.

FOOTNOTES

1. Statistics Canada Catalogue No. 71-529 (Labour Force Annual Average) and 71-001 (The Labour Force February 1984).

2. British Columbia Population Projections, 1984-2006. BC Research, June, 1983.

3. Regional District of Kootenay Boundary. Toward a Community Plan for Rossland. 1981.

4. BC Ministry of Forests, Nelson Forest Region, Boundary Timber Supply Yield Analysis Report, March 1981. Kootenay Lake Timber Supply Area Yield Analysis, December, 1980.

5. BC Ministry of Forests, Nelson Forest Region. Arrow Timber Supply Area Yield Analysis Report, May 1981.

6. Central Kootenay Regional District, 1979. Arrow Lakes Regional Plan: Economic Study. Technical Paper No.2, 1979.

7. Jim Switzer, Manager Canada Employment Centre, Trail. Personal communication.

8. Castlegar News, Supplement. Recreation, Business, and Industrial Review. March 1981.

9. Ministry of Industry & Small Business Development. Industrial & Commercial Expansion in BC, January-June 1980.

10. Regional District of Kootenay Boundary. op. cit.

11. L. Embree, Business Agent, Carpenters Local 2300 Castlegar and 2458 Nelson. Personal communication.

12. K. Malcolm, Business Representative Tunnel and Rockworkers Union LOcal 168, Nelson. Personal communication.

13. Total employment divided by basic employment = 13,700 divided by 6,910 = 1.98.

14. Revenue Canada. Taxation Statistics, 1979.

5.0 IMPACTS OF KEENLEYSIDE-MURPHY PROJECT

5.1 Population Impacts

Appendix D provides a detailed description of the methodology and data used to calculate the population, income, and employment impacts of the Keenleyside-Murphy Project. The following subsections discuss the major assumptions used in the analysis and present the results from the analysis.

5.1.1 Project Labour Force

BC Hydro has supplied preliminary estimates of project labour force requirements for the two projects, as well as for the construction of the associated transmission lines. These are summarized in Table 5-1.

Construction on the Keenleyside Powerplant Project is assumed to commence in 1986/87 and in 1987/88 for Murphy Creek. The expected completion date for Keenleyside is August, 1993, and for Murphy Creek it is October, 1994. (As noted in the Preface, these dates have changed, and are subject to further change.) Peak labour force requirements would occur in 1991/92, when maximum manpower on site is projected to reach 1,660. The average during this year would be 1,405. Over the nine year construction period, the two projects would provide nearly 5,500 person-years of employment.

The operating labour force at Murphy Creek would be similar to that at Seven Mile which requires 18 year-round employees. Annual maintenance at Murphy Creek would require 30-40 employees for about 6 weeks. Additional operating employment at Keenleyside would require six people on a year-round basis. Seasonal employment for maintenance is expected to be nominal.

Because of the small size of the Keenleyside and Murphy Creek operating work force and the possibility that a number of

TABLE 5-1: KEENLEYSIDE-MURPHY PROJECT CONSTRUCTION LABOUR FORCE ESTIMATES

	ONSITE LABOUR							
	Projects Combined*		Murphy Creek		Keenleyside		Transmission Line	
Fiscal Year	Person-Years	Peak Per Year	Person-Years	Peak Per Year	Person-Years	Peak Per Year	Person-Years	Peak Per Year
1986/87	40	150	-	-	40	150	-	-
1987/88	166	250	10	50	156	200	-	-
1988/89	277	450	165	250	112	200	-	-
1989/90	835	1,050	345	450	460	540	30	60
1990/91	1,194	1,530	760	980	404	490	30	60
1991/92	1,405	1,660	935	1,100	415	500	55	60
1992/93	1,078	1,400	840	1,000	228	340	10	60
1993/94	505	800	470	670	35	130	-	-
1994/95	75	200	75	200	-	-	-	-
Total	5,575		3,600		1,850		125	

* including the transmission line employment.

Source: BC Hydro preliminary estimates provided December, 1982. The Murphy Creek figures refer to the "424 meter" project alternative. The BC Hydro fiscal year is from April 1 to March 31.

these jobs could be filled by local residents (reflecting the high unemployment projected for the study area), the population impacts from operations are expected to be minimal and, therefore, are not computed here.

Tables D-4, D-6, and D-8 in Appendix D detail the construction labour force requirements of the two projects by year and occupational category. The construction trades that would be in greatest demand are tunnel and rockworkers, electrical workers, carpenters, and operating engineers. It should be repeated that these are preliminary estimates only and the trade distribution of the construction labour force may change as project designs are modified.

The trades distribution was used as the starting point in determining the labour force requirements that could be satisfied by workers currently residing in the study area.

Accurate forecasting of the number of local workers available to the project is difficult because of the dynamic nature of the construction industry, the high mobility of construction workers, and the uncertainty surrounding the timing and magnitude of other major construction projects. Table 5-2 presents an estimate of the local labour force potentially available to the project. The following factors have been considered in making this estimate:

- current and projected overall unemployment rates in the study area
- historic and current unemployment levels in the construction trades
- the number of local tradespeople currently employed outside the area
- probable demands from other construction activity
- union hiring practices.

TABLE 5-2: ESTIMATED RESIDENT LABOUR FORCE AVAILABLE TO KEENLEYSIDE-MURPHY PROJECT

Occupational Category	Number
Tunnel & Rockworkers	140
International Brotherhood of Electrical Workers	50
Carpenters	120
Machinists	70
Operating Engineers	100
Boilermakers	40
Office & Technical Employees	80
Culinary Workers	40
Teamsters	75
Cement Masons	5
Pipefitters	10
Iron Workers	10
Miscellaneous Trades	40
Supervisory	--
Owner's Staff	--
Total: All Occupations	780

The following factors were given significant weight in determining the resident labour force available to the project.

- Despite the out-migration and modest population growth anticipated for the study area, overall unemployment rates in the area are expected to be well above the provincial norm over the next decade-and-a-half. This situation reflects the time required for labour markets and population to adjust to the lower employment growth in the study area compared with other parts of the province.

- Many of the labour unions reported very high unemployment rates among their members in the study area. Some of the same unions, particularly the Tunnel and Rockworkers, the Carpenters, and IBEW, reported that many of their members now resident in the study area are working in other parts of the province.

- Detailed unemployment data by occupation based on Unemployment Insurance claims confirmed the high rates of unemployment among many of the construction trades required by the project.

The resident labour force available was compared with the construction labour force requirements by year and occupation to determine the proportion of the requirements likely to be satisfied by study area residents. A key assumption was that non-resident workers are required only after the local supply has been exhausted. This is consistent with the hiring practices of most unions and the projected labour market conditions in the study area when compared with other parts of the province.

Four other factors were employed in completing this allocation:

- Labour market conditions in the study area from 1986 on are expected to improve, but this process will occur quite slowly. Unemployment in the study area probably averaged over 15% of the work force during 1982 and 1983. Rates in the 10-13% range are projected for the study area during the 1986-95 period.

- To be conservative and to remove the effects of seasonal fluctuations, September, 1981 data were given greatest weight in determining labour force availability by occupation. In the study area, labour demands reach a peak in September and October.

- Supervisory and owner's staff positions will be held by permanent BC Hydro staff brought in from other parts of the province.

- Workers on transmission line construction would be brought in from outside the study area (no local hire) and would reside in construction camps.

Table 5-3 presents the estimates of local hiring for the two projects combined, based on the above allocation rules. The proportion of the labour force available locally varies from about 90% in the early construction years to less than 60% in the peak construction years. Aggregating over all years, about 65% of the construction labour force requirements would be satisfied by resident workers. This compares with the 63% figure for the Seven Mile Labour Force as reported in October, 1977.[1] The slight difference can be explained by the higher unemployment rates projected for the study area over the present projection period compared to the mid to late 1970's.

TABLE 5-3: PROJECTED DISTRIBUTION OF WORK FORCE BETWEEN RESIDENT AND NON-RESIDENT WORKERS: KEENLEYSIDE-MURPHY PROJECT

Fiscal Year	Local Residents No.	Local Residents % of Total	In-Migrants No.	In-Migrants % of Total	Total
1986/87	36	90	4	10	40
1987/88	151	91	15	9	166
1988/89	246	89	31	11	277
1989/90	595	71	240	29	835
1990/91	673	56	521	44	1,194
1991/92	733	52	672	48	1,405
1992/93	726	67	352	33	1,078
1993/94	385	76	120	24	505
1994/95	66	88	9	12	75
Total: All Years	3,611	65	1,964	35	5,575

Source: Tables D-2 through D-9 of Appendix D. Table 5-1. It was assumed that for transmission line employment, person-years was equivalent to the number of workers.

TABLE 5-4: PROJECTED DISTRIBUTION OF WORK FORCE BETWEEN RESIDENT AND NON-RESIDENT WORKERS: MURPHY CREEK AND KEENLEYSIDE POWERPLANT AS SEPARATE PROJECTS

	Murphy Creek					Keenleyside*				
	Local		Immigrants			Local		Immigrants		
	No.	%	No.	%	Total	No.	%	No.	%	Total
1986/87	-	-	-	-	-	36	90	4	10	40
1987/88	8	80	2	20	10	143	92	13	8	156
1988/89	146	88	19	12	165	101	90	11	10	112
1989/90	303	88	42	12	345	399	81	91	19	490
1990/91	582	77	178	23	760	345	79	89	21	434
1991/92	649	69	286	31	935	347	74	123	26	470
1992/93	644	77	196	23	840	205	86	33	14	238
1993/94	362	77	108	23	470	31	89	4	11	35
1994/95	66	88	9	12	75	-	-	-	-	-
Total: All Years	2,760	77	840	23	3,600	1,607	87	243	13	1,850

*Transmission line labour force has been assigned to the Keenleyside Powerplant Project.

Source: Tables D-6 through D-9 of Appendix D.

The situation may also reflect the cumulative buildup of construction trade skills in the study area as a consequence of previous hydro projects. With respect to individual construction trades, Table D-5 of Appendix D indicates that the study area can satisfy the majority of project requirements with the exception of cement masons, pipefitters, iron workers, and electrical workers.

The same kind of analysis was completed on the assumption that either Murphy Creek or Keenleyside might proceed separately (i.e., one without the other). These results are presented in Table 5-4. The proportion of requirements satisfied by resident workers would be somewhat higher in the case of Keenleyside alone, reflecting its smaller construction labour force.

5.1.2 Direct and Indirect Population Impacts

The direct population increase due to the project depends on the proportion of the in-migrant work force that would bring their families with them (and therefore would not live in construction camps) and the number of dependents per family. Our analysis suggests that a significant proportion of in-migrants in the supervisory and owner's staff categories would be in the study area for an extended period and, therefore, would bring their families with them. It was assumed that in each year 75% of owner and supervisor staff would choose to live in permanent housing in the study area. These workers are labelled as "permanent" inmigrants.

In sharp contrast, the inmigrant workers among the other occupational categories (mainly the construction trades) would typically only be needed for periods of one year or less. This is because these projects are expected to have a very high resident labour force. For the Keenleyside-Murphy Project, the resident labour force as a percentage of the yearly total would range from 52% to 91%. When this is compared to a resident labour force at Revelstoke of less than 12%, it is clear that the longer term positions would be filled by study area residents. Furthermore, many of the longer term positions that cannot be filled by local residents would be taken by workers from the Okanagan-Shuswap and Kootenays where there is a sizeable work force who have experience on BC Hydro projects. Based on the Revelstoke experience, these workers would not move their homes to the Castlegar-Trail area. Instead, they would live in the camps and commute home on their days off. (At Revelstoke, this preference for commuting rather than moving one's home and family resulted in a lower permanent inmigrant population than had been predicted.) It is assumed, therefore, that all inmigrant workers who are not owners/supervisory staff would reside in the construction camps. At Keenleyside-Murphy during the five peak years of construction, from 12% to 31% of the inmigrants would be permanent residents. This compares with a figure of about 17% at Revelstoke. As with all assumptions, there is always a margin of error either way. For example, a higher proportion of the total labour force may choose to live in permanent housing, thereby increasing the direct population impact, and the reverse may also occur.

Table 5-5 divides the inmigrant workers between permanent and camp residents for the three project alternatives considered earlier. For the Keenleyside-Murphy Project, , construction camp figures are given for the average number of workers living in camp during the course of a year and also the peak number at some time during that year.

Turning to the second factor, it is assumed that workers who bring their families into the study area average 2.05 dependents per family. This is consistent with experience at the Revelstoke construction site.[2] Table D-11 of Appendix D indicates on a calendar year basis the contributions of camp and permanent residents to the direct population impacts of the three project alternatives. For the two projects combined, the direct population impact is greatest in 1991 when the projects add almost 800 people to the population of the study area.

TABLE 5-5: DISTRIBUTION OF IN-MIGRANT WORKERS BETWEEN PERMANENT RESIDENTS AND CAMP RESIDENTS*

	Keenleyside-Murphy			Murphy Creek Only			Keenleyside Only		
Year	P	C	PKC	P	C	PKC	P	C	PKC
1986/87	3	1	111	-	-	-	3	1	111
1987/88	11	4	88	2	0	40	10	3	147
1988/89	23	8	181	14	5	90	8	3	91
1989/90	56	184	399	27	15	120	29	62	172
1990/91	70	451	787	44	134	354	26	63	179
1991/92	80	592	847	54	232	397	26	97	187
1992/93	59	293	615	46	150	310	13	20	182
1993/94	37	83	378	34	74	274	3	1	96
1994/95	7	2	127	7	2	27	-	-	-

P = Permanent Workers; C = Average Construction Camp Residents; PKC = Peak Construction Camp Residents

* including Transmission line workers.

Source: Table D-10 in Appendix D and Table 5-1.

Indirect population impacts during construction could result from a number of sources. There could be in-migration resulting from the increased employment caused by the supplier-related and respending effects of the project. As well, the new housing construction resulting directly or indirectly from these projects could necessitate in-migration to fill new positions created in the residential construction industry. For the reasons described below, the respending effects of the project are expected to be much greater for income than for employment, while the supplier-related effects would be quite minor. Because of the fairly low rate of new household creation in the "without the project" projections, the construction industry is expected to be operating at below capacity in the absence of the hydro projects. In general, job creation from these sources is expected to be small. Furthermore, because of the high unemployment projected for the study area, any new jobs that are created would likely be filled by local residents. As a consequence, the indirect population impacts during construction are expected to be very small.

Finally, because of the small size of the operating work force, the direct and indirect population impacts during operations are expected to be negligible and, therefore, have not been computed. Accordingly, the population increase resulting from these projects is limited to the direct construction impacts. Table 5-6 compares the without and with the project population projections for the 1986 through 1995 period for the three project alternatives.

Table 5-6 indicates that the Keenleyside-Murphy Project would have a positive, but small impact on the population of the study area. The project results in more rapid population growth through the late 1980s to a peak of nearly 39,300 in 1991. The total study area population then slowly decreases by 600 to 38,700 in 1995. For the two projects combined, the percentage impact exceeds 1% in only the three peak construction years. Particularly noteworthy is the very slight impact of the Keenleyside Powerplant project in the event that this project proceeds without the Murphy Creek Project. Corresponding to the project's small population impacts, the effects on municipal infrastructure and community services would also be small.

The projected number of in-migrant workers taking up permanent residence in the study area (see Table 5-5) indicates the project impacts on the number of households and housing in the study area. Again, the project impacts would be very small, adding less than 1% to the total number of households in the study area in even the peak construction years. New house construction caused by the two projects

TABLE 5-6 : POPULATION PROJECTIONS FOR THE STUDY AREA: WITHOUT AND WITH THE PROJECT

Year	W/O Project	Murphy Creek/* Keenleyside Combined			Murphy Creek Only			Keenleyside Only		
		Pop.	Impact		Pop.	Impact		Pop.	Impact	
			No.	%		No.	%		No.	%
1981	35,440	35,440	-	-	35,440	-	-	35,440	-	-
1986	37,100	37,107	7	.02	37,100	-	-	37,107	7	.02
1987	37,400	37,430	30	.08	37,406	6	.02	37,429	29	.08
1988	37,700	37,768	68	.18	37,738	38	.10	37,727	27	.07
1989	37,900	38,386	286	.75	37,994	94	.25	35,009	109	.29
1990	38,200	37,788	588	1.54	38,441	241	.63	38,330	130	.34
1991	38,500	39,292	792	2.05	38,891	391	1.02	38,644	144	.37
1992	38,600	39,163	563	1.46	38,927	327	.85	38,677	77	.20
1993	38,600	38,866	266	.69	38,808	208	.54	38,620	20	.05
1994	38,700	38,766	66	.17	38,760	60	.16	38,703	3	.01
1995	38,700	38,706	6	.02	38,706	6	.02	38,700	-	-
1996	38,800	38,800	-	-	38,800	-	-	38,800	-	-

Source: Table 4-1 of Chapter 4 and Table D-11 of Appendix D.

N.B. Project impact (No.) equals the "With the Project" projection minus the W/O projection.
The "%" figure equals the Project Impact divided by the W/O Project projection X 100.

* These figures include all the transmission line workers.

combined would not exceed 30 houses in any one year. The actual impact could be much lower in light of the high house vacancy rates likely to occur in the study area. Any housing construction resulting from the project would be significant to the study area's residential housing industry which would be operating below recent levels of activity.

The reader should note that the tables describing the project labour force are presented in BC Hydro fiscal years. This corresponds to the method of presentation for all BC Hydro planning documents. However, in discussing population impacts we have converted from fiscal years to calendar years because this is the method of presentation typically used for population. The use of two different definitions means that there will be some apparent discrepancies between tables.

5.1.3 Demographic Characteristics of In-Migrants

Survey data from Revelstoke[3] show that the Revelstoke project had a relatively mature work force, consistent with the long history of hydroelectric generating projects in the West Kootenays. Three-quarters of the labour force were between 25 and 54 years old. The 35-44 age group was the largest (27%), closely followed by the 45-54 age group (25%) and the 25-34 group (24%). Almost 13% were under 25 and 12% over 55. About half were married. Only about 2% of the Revelstoke labour force were female. The Keenleyside-Murphy labour force can reasonably be assumed to have similar characteristics.

The ages of in-migrant children are important for projecting the school and other service requirements. At Revelstoke, 27.9% of the children were under 6 years old, 46% were aged 6 to 13, and 26.1% were aged 14-19. This is very similar to the present population distribution in both School Districts #9 and #11.

Table 5-7 provides a breakdown of the permanent residents resulting from the project divided between project employees, adult dependents, and children by age group. This breakdown assumes the experience at Revelstoke is applicable to Murphy Creek and Keenleyside.

5.1.4 Distribution of Population Increase

(a) In-Migrants

The distribution of inmigrant population not living in the construction camps would depend on the availability and price of housing in different localities,on individual preferences (e.g., with respect to urban or rural living), and on whether the worker is employed at the Murphy Creek or Keenleyside site. The Murphy Creek site is between Castlegar and Trail; therefore, project workers could live in either community. The Keenleyside site is north of Castlegar; therefore, workers would likely prefer that community. When the projects are combined, it is difficult to identify the proportion of in-migrant workers that would be employed at each construction site and some workers may be employed on both sites at different times. The distribution in Table 5-8 is based on the relative contributions of the two projects to combined permanent in-migration in each year.

The 1976 Census reported that in-migrants to the study area between 1971 and 1976 were distributed approximately as follows: 20% to Castlegar, 20% to rural areas near Castlegar, 25% to Trail, 10% to Rossland, 10% to the smaller area municipalities, and 15% to rural areas near Trail. For this analysis, it was assumed that the permanent in-migrant population resulting from the project would be distributed as follows: 35% to Castlegar, 15% to rural areas near Castlegar, 25% to Trail, 5% to Rossland, 10% to the smaller municipalities, and 10% to rural Trail areas. This distribution uses the 1971-76 distribution of in-migrants as the starting point and modifies it based on the estimated distribution of inmigrant workers between the two projects and on projected housing availability in the various localities.

TABLE 5-7: DISTRIBUTION OF PERMANENT RESIDENTS: KEENLEYSIDE-MURPHY PROJECT

Year	Total	Project Employees	Adult Dependents	Children by Age 0-5	6-13	14-19	Total
1986	6	2	2	1	1	0	2
1987	27	9	7	3	5	3	11
1988	61	20	17	7	11	6	24
1989	146	48	40	16	27	15	58
1990	204	67	56	23	37	21	81
1991	235	77	64	26	43	25	94
1992	195	64	53	22	36	20	78
1993	131	43	36	14	24	14	52
1994*	49	16	18	6	9	4	19

* Includes numbers for fiscal year 1994/95.

Source: Calculated from Table 5-5 and the Revelstoke Labour Force Survey, 1979/80.

TABLE 5-8: POPULATION IMPACT (PERMANENT RESIDENTS ONLY) OF KEENLEYSIDE MURPHY PROJECT DISTRIBUTED BETWEEN THE TWO PROJECTS

Year	Murphy Creek	Keenleyside	Total
1986	0	6	6
1987	5	22	27
1988	36	25	61
1989	72	74	146
1990	122	82	204
1991	157	78	235
1992	146	49	195
1993	115	16	131
1994*	46	3	49
Total:			
All Years	699	355	1,054

* Includes numbers for fiscal year 1994/95.

Source: Table D-11. The relative contribution of each project was calculated using the sum of in-migration associated with each project as the base.

(b) Relocation of Existing Population

The proposed Murphy Creek Project would affect residential land by inundation, by rendering land potentially hazardous for residential development, or by raising groundwater levels above normal. (The Keenleyside Powerplant Project would have no effect on residential land.) BC Hydro estimates that 444 privately owned, residential properties, of which 321 are improved, would be affected.[4] As shown in Tables 5-9 and 5-10, it is estimated that the residences on 57 to 121 properties could be affected. The actual number would depend on the type of protection installed.

An estimated 200 households would be affected by the Murphy Creek Project if no mitigation works were constructed. Construction of toe protection and other mitigation measures would reduce this impact to 136 households, of which at least 89 households (or 250 residents) would have to permanently relocate.

TABLE 5.9: ESTIMATED NUMBER OF RESIDENCES ON IMPROVED RESIDENTIAL PROPERTIES AFFECTED BY THE MURPHY CREEK PROJECT (WITH PROPOSED TOE PROTECTION INSTALLED)

		Potential Hazard				
	Inundated	Non-Steep Banks	Steep Banks	Low-Lying	Ground-Water	Totals
Regional District of Central Kootenay						
City of Castlegar	0	1	21	9	4	35
Robson	0	1	0	6	0	7
Raspberry/Brilliant	0	0	0	0	3	3
Ootischenia	0	0	1	1	0	2
Regional District of Kootenay Boundary						
China Creek/Genelle	10[1]	0	0	0	0	10
Rural	0	0	0	0	0	0
Totals	**10**	**2**	**22**	**16**	**7**	**57**

1. Includes the Whispering Pines Mobile Home Park which has approximately 80 occupied units.

Source: BC Hydro, Murphy Creek Project Residential Properties Acquisition Report, Final Draft, Report No. 2457R, March, 1984.

TABLE 5.10: ESTIMATED NUMBER OF RESIDENCES ON IMPROVED RESIDENTIAL PROPERTIES AFFECTED BY THE MURPHY CREEK PROJECT (WITH MANDATORY PROTECTION[1] INSTALLED)

		Potential Hazard				
	Inundated	Non-Steep Banks	Steep Banks	Low-Lying	Ground-Water	Totals
Regional District of Central Kootenay						
City of Castlegar	0	6	71	9	4	90
Robson	0	2	0	6	0	8
Raspberry/Brilliant	0	0	3	0	3	6
Ootischenia	0	0	6	1	0	7
Regional District of Kootenay Boundary						
China Creek/Genelle	10[2]	0	0	0	0	10
Rural	0	0	0	0	0	0
Totals	**10**	**8**	**80**	**16**	**7**	**121**

1. Mandatory protection protects or maintains essential services (e.g., roads, railways, bridges, sewage facilities).
2. Includes the Whispering Pines Mobile Home Park.

Source: BC Hydro, Murphy Creek Project Residential Properties Acquisition Report, Final Draft, Report No. 2457R, March, 1984.

For all communities except Genelle the percentage of the population that would have to relocate is no more than 4%. However, the project would require relocation of 31% of the Genelle population.

TABLE 5-11: ESTIMATED EFFECTS OF MURPHY CREEK PROJECT ON HOUSING UNITS AND RESIDENTS

	Properties with Residences Affected	Housing Units Affected	Housing Units[1] Relocated	Residents Relocated Off Properties[2] No.	Residents Relocated Off Properties[2] % of 1981 Population
Regional District of Central Kootenay					
City of Castlegar	35-90	35-90	0-35	0-98	up to 1.4
Robson	7-8	7-8	0-7	0-20	up to 1.9
Raspberry/Brilliant	3-6	3-6	0-3	0-8	up to 4.3
Ootishcenia	2-7	2-7	0-2	0-6	up to 0.9
Regional District of Kootenay Boundary					
China Creek/Genelle	10	89	89	250	31
Total	57-121	136-200	89-136	250-382	

1. Assumes that BC Hydro would construct toe protection and would acquire 10 inundated properties and up to 2 properties affected by non-steep banks, up to 22 properties affected by steep banks, up to 16 properties in low lying areas, and up to 7 properties affected by groundwater.

2. Assumes average household size of 2.8.

Sources: Table 5-8 and 5-9.

The impact of this relocation depends partly on the new areas chosen for residence. If households relocate in the same community, the net impact is less than if they relocate to other nearby communities or out of the region altogether.

Location decisions are complex and can be influenced by many factors, including the level of community services, access to employment and shops, recreational opportunities, and aesthetics. The availability, type, and price of housing are important variables which change locally from year to year or even monthly. The Murphy Creek Household Survey generated information about the locational preferences of households likely to be relocated as a result of the development (see Table 5-12). This provides a basis to predict where they would resettle. However, it is important to recognize that these preferences would not necessarily be realized. They would be influenced significantly by the availability of housing and employment constraints.

TABLE 5-12: DISTRIBUTION OF RESPONSE, SURVEY GROUP 1 (POTENTIALLY RELOCATED RESIDENTS): FIRST CHOICE OF WHERE TO MOVE (Percent of Response)

	Relocate From			
	Robson/ Raspberry/ Brilliant/ Ootischenia	Castlegar		Genelle
Move to		North	South	
Robson	16.7	6.3	5.0	-
Raspberry	5.6	-	-	-
Brilliant/Ootischenia	-	9.4	-	-
Castlegar North	5.6	68.8	25.0	-
Castlegar South	-	9.4	50.0	7.7
Blueberry	-	-	5.0	3.8
Genelle	-	-	5.0	34.6
Trail	-	-	-	11.4
Other West Kootenay	33.3	-	5.0	26.9
Other BC	38.9	6.2	5.0	15.3
Number of Respondents	(18)	(32)	(20)	(26)

Source: Murphy Creek Household Survey.

Several patterns are evident from Table 5-12. The largest proportion of respondents would prefer to relocate in the same community. After that, there is a clear tendency to choose locations close to the present community. Within the study area, no resident of the Robson/Raspberry/Brilliant/Ootischenia area would choose a location south of North Castlegar. No resident of Genelle indicated a preference for a location further north than South Castlegar. It should also be noted that many of the "other West

Kootenay" responses referred to areas nearby, such as along the Arrow Lakes, which share some of the characteristics of the affected riverside communities.

One response that is difficult to deal with is the people who indicated that they would leave the study area and the West Kootenays if they were forced to relocate as a consequence of the Murphy Creek Project. The decision to leave a larger region -- as distinct from a specific locality -- is typically based on the lack of employment there. In light of the construction employment provided by it, a project like Murphy Creek would be expected to decrease, not increase, out-migration (on a "net" basis) from the study area. Accordingly, our "with the project" population projections are higher than the "without the project" population figures (Table 5-6), reflecting the anticipated reduction in net out-migration as a result of the project.

Relocation out of the reservoir areas would be expected to have an impact on only the distribution of population within the study area. Our view, therefore, is that the people who indicated they would leave the study area would be emigrating in any event, and therefore are already captured in the without the project projections in Table 4-1. (As an alternative hypothesis, it can be argued that people who leave the region because of relocation caused by Murphy Creek would leave jobs which would be filled by current residents who otherwise would be forced to leave the region in search of employment. The net effect on migration would be the same.)

In light of the preference shown by the remainder to stay in the same localities, the assumption was made that relocation caused by the Murphy Creek Project would not affect the distribution of population in the study area when the broad six-part breakdown used in Table 5-13 is employed.

TABLE 5-13: PROJECTED IMPACTS OF THE KEENLEYSIDE-MURPHY PROJECT ON POPULATION DISTRIBUTION OF CASTLEGAR/TRAIL AREA: 1981-1996

		1981	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Trail:	W/O	9,599	9,830	9,866	9,902	9,938	9,974	10,010	9,986	9,962	9,938	9,914	9,890
	With	9,599	9,830	9,873	9,917	9,975	10,025	10,069	10,035	9,995	9,949	9,917	9,890
	Impact	—	—	7	15	37	51	59	49	33	11	3	—
Castlegar:	W/O	6,902	7,420	7,514	7,608	7,702	7,796	7,890	7,942	7,994	8,046	8,098	8,150
	With	6,902	7,424	7,523	7,629	7,753	7,867	7,972	8,010	8,040	8,061	8,098	8,150
	Impact	—	4	9	21	51	71	82	68	46	15	—	—
Rossland:	W/O	3,967	4,150	4,174	4,198	4,222	4,246	4,270	4,278	4,286	4,294	4,302	4,310
	With	3,967	4,150	4,175	5,001	4,229	4,256	4,282	4,288	4,293	4,296	4,304	4,310
	Impact	—	—	1	3	7	10	12	10	7	2	1	—
Other Municipalities:*													
	W/O	5,102	5,380	5,422	5,464	5,506	5,546	5,590	5,606	5,622	5,638	5,654	5,670
	With	5,102	5,380	4,425	5,470	5,521	5,568	5,614	5,626	5,635	5,642	5,651	5,670
	Impact	—	—	3	6	15	20	24	20	13	4	1	—
Rural (Trail) SD #11	W/O	4,272	4,490	4,524	4,558	4,592	4,626	4,660	4,666	4,672	4,678	4,684	4,690
	With	4,272	4,490	4,527	4,568	4,663	4,919	5,118	5,006	4,813	4,705	4,685	4,690
	Impact	—	—	3	10	71	293	458	340	141	27	1	—
Rural (Castlegar) SD #9	W/O	5,598	5,860	5,904	5,948	5,992	6,036	6,080	6,090	6,100	6,110	6,120	6,130
	With	5,598	5,863	5,911	5,960	6,098	6,178	6,238	6,167	6,127	6,116	6,120	6,130
	Impact	—	3	7	12	106	142	158	77	27	6	—	—
Total:	W/O	35,440	37,100	37,380	37,660	37,940	38,220	38,500	38,560	38,620	38,680	38,740	38,800
	With	35,440	37,107	37,410	37,728	38,226	38,808	39,292	39,123	38,886	38,746	38,746	38,800
	Impact	—	7	30	68	286	588	792	563	266	66	6	—

* Includes Fruitvale, Montrose, and Warfield which are all in SD #11.

Note: Columns may not add due to rounding.

(c) Overall Impact on Population Distribution

Table 5-13 shows the projected impact of the Keenleyside-Murphy Project on the distribution of population in the study area. As described above, this with-the-project distribution reflects the location decisions of the in-migrant population resulting from the project. It also reflects the anticipated locations of the construction camps for the two sites. The Murphy Creek camp is expected to be in the Rivervale/Oasis area while the Keenleyside camp would be in the rural area near Robson, likely very close to the Hugh Keenleyside dam. Table 5-14 shows the distribution of the camp population between the two sites, based on the relative contributions of the two projects to the combined camp population in each year.

TABLE 5-14: ESTIMATED DISTRIBUTION OF CONSTRUCTION CAMP POPULATION FOR KEENLEYSIDE POWERPLANT PROJECT AND MURPHY CREEK PROJECTS

	Distribution Between					
	Murphy Creek*		Keenleyside**		Total	
Year	Person Years	Peak	Person Years	Peak	Person Years	Peak
1986	-	-	1	83	1	83
1987	-	-	3	94	3	94
1988	4	40	3	118	7	158
1989	56	129	84	193	140	322
1990	273	470	111	190	384	660
1991	434	640	123	181	557	821
1992	320	551	48	83	368	634
1993	128	403	7	22	135	425
1994	23	95	0	-	23	95
1995	-	-	-	-	0	0

* Located in Rural (Trail) SD#11.
** Located in Rural (Castlegar) SD#9.

The impacts of the two projects combined on any given community would be small. The largest impact in relative terms would be on the rural area surrounding Trail. In 1991, its population is projected to be higher by about 10% as a result of the projects. However, all but 24 of these people would be living in the Murphy Creek construction camp. For all the other communities and sub-areas except rural Castlegar, the relative impact would never exceed 1.5% even in the peak construction years. The estimates suggest that the population of rural Castlegar would be higher by 3% in 1991, but as is the case with rural Trail, most of these people would be living in the construction camp.

Because of the small figures, no attempt has been made to distribute the population impacts assuming that Murphy Creek or Keenleyside proceeds alone. In the case of Keenleyside alone, the population impacts would be concentrated in the City of Castlegar and the surrounding area. In the peak construction years of 1989-92, the impacts would likely be comparable to those shown in Table 5-13. If Murphy Creek were to proceed on its own, the population impacts would be somewhat lower in the Castlegar area, but otherwise the impacts in the peak years of 1990-1993 would be quite close to the figures in this table.

5.2 Impacts on the Study Area and Regional Economy

Expenditures on the Keenleyside-Murphy Project within the Castlegar/Trail area would initiate a cycle of spending resulting in increased income for local residents and businesses, in-migrant workers, and individuals and firms outside the study area. The first round of expenditures would result from project payroll and local purchases of supplies and services. Estimates are given in Table 5-15. Project payroll is taken directly from employment estimates (Table 5-1) using an average construction wage of $33,200.[5] Local expenditure on supplies and services is assumed to be approximately proportional to that on the Seven Mile Project.[6]

TABLE 5-15: KEENLEYSIDE MURPHY PROJECT LOCAL EXPENDITURES

Year	$1980 Thousands Wages & Salaries	$1980 Thousands Supplies & Services
1986/87	1,328	73
1987/88	5,511	304
1988/89	9,196	507
1989/90	27,722	1,528
1990/91	39,640	2,184
1991/92	46,646	2,571
1992/93	35,790	1,972
1993/94	16,766	924
1994/95	2,490	137
Total	185,090	10,200

Source: Based on employment estimates Table 5-1.

Expenditures by project workers enter the local economy as do local expenditures on supplies and services. Further local income is created in local industries which expand to supply the needs of the project (indirect income). Additional induced income results from respending of the direct and indirect income.

5.2.1 Local Expenditures by Project Employees

In calculating the induced or respending effects generated by project construction, it is necessary to estimate the proportion of consumer spending of construction camp residents that would be expected to occur in the study area. Studies of previous hydroelectric projects in British Columbia have estimated local expenditures at between 10%[7] and 15%[8] of disposable income. Data from the Revelstoke Labour Force surveys suggest an average of about 12.5% of disposable income is spent locally.[9] This figure has been applied in the present case to estimate worker expenditure.

Local expenditure by resident workers is considerably higher. The typical expenditure pattern for families in the $20,000-$25,000 income group was derived from 1976 national data.[10] The proportion of each category spent locally was then estimated, resulting in a total of 75% of disposable income. The income allocated to local expenditures is included under item 4 in Table 5-16. When the indirect effects are included, this amount exceeds $20 million in 1991/92 and totals $94 million over the life of the project.

5.2.2 Local Expenditures on Supplies and Services

Item 2 of Table 5-16 shows the local value added generated by local expenditures on supplies and services, based on experience with the Seven Mile project. Major items could include building supplies, lumber, automotive service repairs and supplies, ready mix concrete, machine works, and motel accommodation. One-third of the total purchases is estimated to provide local value added consistent with estimates for the Seven Mile Project.[11]

5.2.3 Other Indirect Income Generation

The only other sector that could expand as a consequence of the Keenleyside-Murphy Project is residential construction. The in-migrant workers who become permanent residents (at least for the duration of their employment on the project) would require houses or apartments. Data from the Revelstoke labour force surveys[12] indicated that two-thirds of in-migrant workers wanted apartments or single family dwellings. Applying this ratio to the in-migrant workers at Keenleyside Murphy who would become permanent residents suggests that the demand for apartments and single family dwellings would reach a maximum of 53 in 1991/92 (see Table 5-5). In light of the high vacancy rate in the rental sector in the Castlegar/Trail area, the subdivision developments now under construction, and the fairly low rate of household creation projected for the study area (Table 4-5), this

TABLE 5-16: IMPACT OF KEENLEYSIDE-MURPHY PROJECT ON PERSONAL INCOME ACCRUING TO CASTLEGAR/TRAIL AREA

($ 1980 Thousands)

	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	Total
1. On-Site Wage Bill	1,328	5,511	9,196	27,722	39,640	46,646	35,790	16,766	2,490	185,090
a) Permanent Residents										
- Current	1,195	5,013	8,167	19,754	23,344	24,337	24,103	12,782	2,191	119,885
- Inmigrants	100	365	764	1,859	2,324	2,656	1,959	1,228	232	11,487
b) Camp Residents	33	133	266	6,109	14,973	19,654	9,728	2,756	66	53,718
2. Local Value Added from Project Supplies & Services	24	101	169	509	728	857	657	308	46	3,400
3. Local Value Added from Residential Construction	--	--	344	344	--	--	--	--	--	688
4. Increase in Income Available for Local Spending	855	3,549	6,022	15,170	18,305	20,491	18,455	9,603	1,609	94,059
5. Induced Incomes	245	1,019	1,728	4,354	5,254	5,881	5,297	2,756	462	26,995
6. Total Increase in Personal Income	1,354	5,628	9,722	23,315	26,660	29,371	27,786	14,844	2,556	141,236

demand should be readily accommodated by the projected stock of houses and apartments. In-migration of construction workers, therefore, would probably not result in any new housing construction in the study area.

However, some of the people relocated as a result of the Murphy Creek Project may wish to move into new housing. Table 5-11 indicates that 89 to 136 housing units, including 80 mobile homes, would require permanent relocation.

For this analysis, it was assumed that 25 of the 56 families now in detached homes would want a newly constructed house. Based on an average unit cost of $55,000, the total value of new residential construction would be $1.375 million, one-half of which is attributed to local income. This amount is distributed evenly over the first two full years of the Murphy Creek Project.

In addition to the effects of permanent relocation, up to 47 homes could be altered as a consequence of the project, e.g., basements could be raised, or berms could be constructed. These alterations could provide work for local tradespeople (e.g., carpenters), sales of lumber and cement for local businesses, and perhaps some benefits to local motels to the extent that residents need to vacate their homes for some period of time. The local income from these alterations could be quite significant -- perhaps many hundreds of thousands of dollars -- but because precise costs are not available at this time, these impacts have not been included with the indirect effects of the project.

5.2.4 Induced Income Effect

Induced income for the study area was estimated by applying a regional income multiplier of 1.287 to the additional income available for local spending from (a) the construction work force and (b) the indirect income from residential construction and project procurement. The derivation of this multiplier is described in Appendix D. The project results in induced income in the study area of $5.9 million in 1991/92 and $27 million over the total construction period.

The final row of Table 5-16 indicates the total personal income provided to permanent residents of the study area as a consequence of project construction. (It is assumed that the construction camp workers would be permanent residents of communities outside the study area, and, therefore, their incomes would contribute to the total personal income of another region.) These figures are used in a later table to highlight the relative impact of the project on the study area's economy. It should be noted that the multiplier effect is assumed here to be instantaneous. In fact, induced spending may lag behind the project's direct impacts by several months to several years. Nonetheless, the major impact occurs in the first round of spending.

5.2.5 Distribution of Income Generated

Data are not available which would permit us to compute a reliable breakdown of the distribution of expenditure within the study area. Based on the relative shares of service sector employment and the possible locations of project employees, it can be postulated that consumer spending resulting from the project will be divided about equally between the Castlegar and Trail areas.

5.2.6 Employment Generation During Construction

Table 5-17 summarizes the employment impacts from the project. The indirect employment effects are computed by applying appropriate value added per employee figures for the construction, manufacturing, and wholesale sectors to the indirect income indicated in Table 5-16. Induced employment was computed in a similar manner, but was adjusted downward to take account of the excess capacity that is expected to arise in the study area's service establishments in the

TABLE 5-17: EMPLOYMENT IMPACT OF THE KEENLEYSIDE-MURPHY PROJECT

	Direct				Indirect	Induced	Total
		Permanent Residents					
	Total	Current	In-Migrant	Camp Residents			
1986/87	40	36	3	1	1	5	46
1987/88	166	151	11	4	3	20	189
1988/89	277	246	23	8	15	34	326
1989/90	835	595	56	184	27	85	947
1990/91	1,194	673	70	451	24	101	1,319
1991/92	1,405	733	80	592	28	111	1,544
1992/93	1,078	726	59	293	21	99	1,198
1993/94	505	385	37	83	10	51	566
1994/95	75	66	7	2	1	8	84
Total: All Years	5,575	3,611	346	1,618	130	514	6,219

absence of these projects (see Appendix D).

5.2.7 Summary of Economic Impacts

Table 5-18 summarizes the impacts of the project on the study area economy. The employment and unemployment impacts are based on the hypothesis that all the current residents who are employed as a direct or indirect consequence of the project would be drawn from the ranks of the unemployed. This would occur either explicitly or implicitly through the operation of the "trickle down" effect which is further described in Appendix D.

Section 5.1.2 indicated that the project's effects on population would be quite small. The project's effects on employment, unemployment, and income would be much greater. In the peak construction years, the number of people employed in the study area would be higher by as much as 5.5% relative to the without the project projection.

The Keenleyside-Murphy Project would have a comparable effect on total personal income in the study area. The relative effect on personal income per capita is somewhat lower, reflecting the small amount of in-migration induced by the project, but the impact is still highly significant. Through the 1989 to 1994 period, per capita income in the study area would be from 3 to 5 percentage points closer to the provincial average as a consequence of the project. In other words, per capita income in the study area would come to 92.7% of the provincial average in 1991 in the absence of the project (see Table 4-8). whereas the corresponding figure with the project would be 98.1% (Table 5-18).

The project would have its most dramatic effect on unemployment in the study area. In the peak construction years (1989-1993), the number of unemployed would be reduced by up to two-fifths, and the unemployment rate would decrease from an average of 12% to an average of 7%. This would be

TABLE 5-18: IMPACTS OF THE KEENLEYSIDE-MURPHY PROJECT CONSTRUCTION ON EMPLOYMENT AND INCOME IN THE STUDY AREA

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Employment										
Without	15,600	15,840	16,080	16,320	16,560	16,800	17,000	17,200	17,400	17,600
With	15,634	15,990	16,361	16,966	17,400	17,731	17,917	17,789	17,583	17,620
Project Impact: No.	34	150	284	652	842	931	917	589	183	20
%	0.2	0.9	1.8	4.0	5.1	5.5	5.4	3.4	1.1	0.1
Unemployment										
Without	2,300	2,260	2,220	2,180	2,140	2,100	2,060	2,020	1,980	1,940
With	2,268	2,219	1,959	1,582	1,367	1,246	1,207	1,474	1,812	1,921
Project Impact: No.	32	141	261	598	773	854	853	546	168	19
%	12.7	12.2	10.7	8.5	7.3	6.6	6.7	7.7	9.3	9.8
Total Personal Income ($ 1980 in '000)										
Without	366,000	380,000	394,000	409,000	423,000	438,000	448,000	458,000	469,000	479,000
With	367,020	384,560	402,560	428,740	448,780	466,690	476,180	476,080	474,630	479,640
Project Impact: No.	1,020	4,560	8,560	19,740	25,780	28,690	28,180	18,080	5,630	640
%	0.3	1.2	2.2	4.8	6.1	6.6	6.3	3.9	1.2	0.1
Personal Income per Capita ($ 1980)										
Without	9,900	10,200	10,500	10,800	11,100	11,400	11,600	11,900	12,100	12,400
With	9,930	10,320	10,710	11,280	11,710	12,070	12,270	12,330	12,230	12,420
Project Impact: No.	30	120	210	480	610	670	670	430	130	20
%	0.3	1.2	2.0	4.4	5.5	5.9	5.8	3.6	1.1	0.2
With Project: % of Provincial Average	90.3	91.7	93.0	93.7	97.3	98.1	97.7	96.2	93.5	93.1

Note: "Project Impact: No. equals the "With Project" figure minus the "Without Project" figure.
"Project Impact: % equals the "Project Impact:No. as a percentage of the "Without Project" figure.
Personal Income per capita is computed using the permanent population of the study area as the denominator.

Source: Tables 4-1, 4-8, 5-14, and 5-15.

closer to, but still somewhat above, the unemployment rates generally projected for the total province and country over these years. The project's favourable effects on employment and income are the result of the large number of unemployed people that are expected to find employment on the project.

No attempt has been made to calculate the employment and income effects of the Murphy Creek or Keenleyside Powerplant projects separately. In broad terms, the separate effects of these projects would be proportional to their employment size. Accordingly, the absolute impacts of Keenleyside, as a separate project, would be about 35% of the impacts of the two project combined. The corresponding percentage for Murphy Creek would be 65%.

In addition, no effort has been made to relate project impacts to the population and economy of the West Kootenay region (the study region for this analysis). It can be said, however, that the absolute impacts would be about the same, and the relative impacts would be lower by a factor of about three-fifths -- the difference in size between the study region and area populations, employment, and so on.

5.2.8 Operating Phase Impacts

Permanent employment from the Keenleyside-Murphy Project would have a moderate local impact. Full-time employment is expected to total 24 employees at the two sites combined. The local payroll would be about $700,000.

Additional local impact would result from annual maintenance. The maintenance crew will include 30 to 40 employees for a period of about 6 weeks. Assuming 12.5% of the total wage bill of $135,000 is spent in the area, $17,000 would enter the local economy each year. Based on $70 per day, a further $84,000 will be spent on accommodation, meals, and transportation. This will provide about $30,000 in local value added.

Using the same assumptions as in the calculation of the construction impacts, the operation of the project would provide about $550,000 in income each year that would be available for consumer spending in the study area. Applying the local multiplier to this results in induced (or respending) income of $158,000 which could generate up to six additional jobs in the service sector of the study area. The annual increment to the personal income of the study area's permanent residents would be approximately $900,000 which would represent less than 0.2% of aggregate personal income projected for the area.

5.2.9 Impact of Other Major Projects

Cominco Expansion

Cominco is in the midst of an eight year expansion program during which upwards of $700 million will be expended. Cominco has directly hired its own construction labour which peaked at about 825 positions. The construction labour force is to be tapered off prior to the tentative start date on Keenleyside-Murphy. It is unlikely that a significant number of these workers will be available to the hydro development for the following reasons:

(1) Cominco intends to retain a substantial number to replace attrition of its operating labour force.
(2) The Cominco construction workers are members of the Steelworkers Union and, therefore, are not available through the usual building trades hiring halls.
(3) There will be a lag of several years before skilled tradespeople from the Cominco project will be needed on the Keenleyside-Murphy construction sites.
(4) Many of the Cominco project staff were recruited outside the area and are likely to leave if they are not taken on to the operations staff.

A drop in local employment opportunities and in population is expected to be associated with completion of the Cominco expansion. This has been taken into account in the baseline population projections to 1986.

BC Timber Ltd. Expansion

Expansion of the BC Timber Ltd. Pulp Mill at Castlegar has been discussed for several years, with capital expenditures variously cited at up to $360 million for a doubling of capacity. Several options are under study, although an expansion of that magnitude has now been ruled out due to lack of space. There are no firm plans for expansion at the present time. However, the most likely option is for expansion of capacity from 524 to 625 tonnes per day. A feasibility study is in progress on this option.

Capital costs would be on the order of $100 million. Assuming average labour content, the project would involve about 700 person-years of construction employment. Further assuming peak employment of 350 and demographics similar to those applied to the Keenleyside Murphy labour force, this construction would bring about 180 people into the area. Approximately 60 workers would live in camp, while another 40 plus dependents would require local housing. The pulp mill expansion could, therefore, have about 40% of the peak impact of the Keenleyside-Murphy Project.

The combined impact of these two projects will depend primarily on their scheduling. In the peak construction year (1991 and 1992), Keenleyside-Murphy would come close to exhausting the available construction labour supply in the study area. Consequently, if the pulp mill expansion overlaps with the peak construction years of the hydro project, a larger proportion of the construction labour requirements of both projects would have to be satisfied by workers from outside the study area. The result would be a higher peak in the local economy, and a corresponding larger drop after the early 1990's. Due to its proximity to both projects, the impact would be most evident in Castlegar. At this time it is impossible to predict the size of the population impact with any accuracy.

Conversely, if the pulp mill expansion can be completed by 1986, it will help to level the dip in economic activity projected to follow completion of the Cominco project. It could also contribute to the availability of skilled trades, such as iron workers and pipefitters, required during the peak years of the Keenleyside-Murphy Project.

Finally, if the pulp mill expansion is delayed until after 1992, it will reduce the impact following the peak years of the BC Hydro project. Some tradespeople would have opportunities to work on the BC Timber Ltd. project. Once again, Castlegar would benefit from the better distribution over time of construction activity.

5.3 Housing and Infrastructure Impacts

5.3.1 Transportation

Two reports prepared for BC Hydro describe project impacts on CP Rail facilities[13] and highways[14]. At this stage of planning, the only identified social impact would be noise and disturbance related to construction. Impacts specific to the residents of each community should be examined after the construction timetable is finalized.

5.3.2 Water and Wastewater Systems

A report by Dayton and Knight Ltd.[15] discusses the impacts of the Murphy Creek project on water supply and distribution and wastewater collection, treatment, and disposal in the area from the Keenleyside dam to south of Genelle. A report by Pacific Hydrology Consultants Ltd. discusses the impacts of the Murphy Creek dam on groundwater and wells along the Columbia River.[16]

Beyond the physical effects of the new dam, impacts on water and wastewater are typically related to population and the number of households. Since these impacts are very small, there would be little, if any, increased demand on the water and wastewater system.

5.3.3 Housing

(a) Housing for Keenleyside-Murphy In-migrant Workers

Information on present housing conditions indicates that the vacancy rate for rental accommodation units was about 10% in the study area in 1982. In addition, the base case projections suggest that, in the absence of the project, the number of households in the Castlegar/Trail area would expand very little over the projection period. This suggests that vacancy rates will remain high for the projection period, especially in relation to the relatively small number of in-migrant workers who will be seeking permanent accommodation. This figure is not expected to exceed 100 even in the peak construction year.

As a final consideration, very few of the in-migrant workers would be in the study area for more than five years, suggesting that few, if any, would want to build a new house. As a consequence of these factors, it is concluded that the in-migrant workers would be readily accommodated by the existing housing stock in the study area, or will bring in or purchase mobile homes. The possible need for more mobile home pads should be assessed within six months prior to construction start up.

The Revelstoke labour force surveys indicated the following distribution of housing preferences among in-migrant workers who bring in their families: 54% preferred single family homes; 13% preferred apartments; and 33% preferred mobile homes. In light of the importance of supervisory and owners staff among in-migrant workers, an even heavier preference for single family homes could be anticipated for the Keenleyside-Murphy Project.

(b) Housing for Murphy Creek Relocatees

The housing requirements for the people whose homes would be acquired as a result of the Murphy Creek Project have been estimated in a preliminary manner, based on the estimated number of affected homes, housing type, and preferred relocation community. When the homes requiring acquisition have been identified definitely, these households should be surveyed to assess their preference for housing locations and housing types. Only then can the specific impacts on the local housing market be described.

Information provided in section 5.1 indicates that 89 to 136 housing units would be acquired as a result of the Murphy Creek project. Even if all of the households from single family residences require newly constructed houses, the residential construction sector in the study area would face no difficulties in providing this housing.

5.3.4 Other Facilities and Businesses

According to March, 1984 estimates from BC Hydro's Properties Division, 5 to 15 commercial/civic properties plus the Whispering Pines Mobile Home Park would be affected by the Murphy Creek reservoir. Once the specific effect on commercial/civic properties is finalized, an assessment of the resultant economic impacts will need to be made.

5.4 Impacts on Local Government Finance

The terms of reference for this study do not call for a detailed investigation of the municipal finance impacts of the Keenleyside-Murphy Project. In the case of a project being added to a region with an expanding economy and population, municipal expenditure and revenue impacts can be approximated through (a) applying per capita averages by expenditure category, as shown in Table 3-18, to the population impacts of the project, and (b) applying typical mill rates and residential assessments to the new housing induced by the project. However, the impacts of this project do not allow the application of these straightforward techniques. For example:

- The (maximum) 80 in-migrant workers who would be seeking permanent housing would be accommodated in existing houses and apartments. The expenditure items tied to population size could go up marginally, but those that are fixed (such as debt charges incurred in the past) would not, resulting in marginally lower per capita costs for current residents with respect to these items.
- The additional population resulting from the project would provide additional municipal revenues in the form of user utility charges and per capita grants.
- The 89 to 136 relocated households who may require new housing would not add to the expenditure items that are tied to population, but could add to expenditures on infrastructure (sewer, water, etc.). The amount of such expenditures would depend on the specific location of this housing.

Therefore, the impacts on local government finance would be quite subtle. Their precise estimation requires detailed knowledge of the average and marginal costs of various expenditure items and the exact locations of the additional households resulting from the project. Regardless, it is clear that the effects of the project on local government finance would be very small indeed. The 80 households added to the study area in 1991/92 would represent less than 1% of the total number of households in the area in that year, while the approximately 25 new houses would represent 0.2% of the total. It is doubtful whether there will be any loss of future municipal taxes in Castlegar from flooding of existing and potential residential land because there is an ample supply of land and homes within the city. As well, the impacts that do occur are expected to be distributed among a number of municipalities. Under these circumstances, the estimation of precise municipal finance effects would appear to be unnecessary. Municipal finance, however, is an issue that should be kept in mind during project monitoring to ensure that the project's effects are not concentrated in one small municipality. Monitoring will be particularly important for the small unincorporated communities.

5.5 Community Service Impacts

The Keenleyside-Murphy Project impacts on local services are directly related to population changes caused by the project. As shown in Table 5-19, the permanent population changes in the study area resulting from the project are expected to be minor, and, therefore would not create any significant increase in the need for community services.

If the Keenleyside Powerplant Project were to proceed without the Murphy Creek Project, its impact on community services would be similarly small. The largest number of permanent inmigrants (including families) in the peak year of Keenleyside construction is predicted to be 82 (see Table 5-8).

Some increased demand for services would be caused by the residents of the two construction camps during the years 1989 through 1993. In particular, they would use hospital emergency services; they would make extensive use of the recreation facilities and services; and they would place additional demand on the RCMP.

TABLE 5-19: IMPACT OF THE KEENLEYSIDE-MURPHY PROJECT ON THE CASTLEGAR/TRAIL AREA POPULATION[1]

	1981	1986....	1989	1990	1991	1992	1993....	1996
SD#11, Trail								
w/o Project	22,940	23,850	24,258	24,394	24,530	24,536	24,542	24,560
w Project	22,940	23,850	24,329	24,516	24,686	24,682	24,658	24,560
Camp	0	0	56	274	435	319	128	0
SD#9, Castlegar								
w/o Project	12,500	13,280	13,694	13,832	13,970	14,032	14,094	14,280
w Project	12,500	13,286	13,768	13,914	14,049	14,081	14,109	14,280
Camp	0	0	84	110	122	49	7	0
Castlegar/Trail Area								
w/o Project	35,440	37,130	37,940	38,220	38,500	38,560	38,620	38,800
w Project	35,440	37,136	39,086	38,424	38,735	38,755	38,751	38,800
Camp	0	0	140	384	557	368	135	0

1. Numbers may not add due to rounding.

Sources: Tables 5-13, D-11.

5.5.1 Medical and Health Services

Hospitals, Doctors	There are adequate hospital beds to meet additional demand for acute care beds and emergency services. In the peak years, there may be a need for an additional doctor or an increased load for the doctors now practising in the area.
Public Health	Increased demand on public health services by permanent inmigrants with young children. This could be a problem if public health services are still understaffed.
Mental Health	Permanent residents will place minimal additional demand on mental

	health services. Camp residents may require alcohol counselling which is non-existent in the area.
Dental Health	Permanent and camp residents would require dental care which can be provided by existing dentists.
Ambulance, Fire, Emergency	BC Hydro will provide its own ambulance and attendants for the camps. Fire and emergency equipment is adequate for additional permanent residents. Additional part-time staff can be recruited from the local area. In Castlegar fire truck access to the Columbia River must be maintained.

5.5.2 Social Services

Ministry of Human Resources (MHR)	The additional permanent residents would have very little demand for MHR services because they would all be employed. Similarly, camp residents would be employed and would not bring their families, so would not require MHR services. A potential problem would be an influx of unemployed transients seeking work. This can be limited by publicity describing hiring practices.
Childrens Services	Permanent residents would add a small number of pre-school children to the area. The incremental demand for services would probably not be noticeable, unless childrens services had been drastically cut.

Senior Citizens Services	All inmigration caused by the project would be working age people and their children who do not require Senior Citizens services.
Other Social Services	The total permanent population increase (235) is too small to create a noticeable increase in demand for other social services. The inmigrants could be a benefit by providing volunteers for social services.

5.5.3 Education

With respect to educational facilities, both School Districts #9 and #11 would have to accommodate children of in-migrant workers, but since the number of children is small they should be accommodated without difficulty. Our analysis indicates that of the in-migrant families who become permanent residents of the study area, approximately 50% would locate in School District #9 and 50% would locate in School District #11.

Table 5-20 shows the estimated number of elementary and secondary school aged children who would move to the Castlegar/Trail area as a result of the Keenleyside-Murphy Project.

During the peak year of construction, each school district could require one additional classroom and one or two teachers. The availability of these classrooms would depend on the distribution fo the inmigrant population. If Keenleyside were to proceed a a separate project, the impact on School District #9 would be even less.

TABLE 5-20: SCHOOL AGE CHILDREN OF IN-MIGRANTS, SCHOOL DISTRICTS #9 AND #11: KEENLEYSIDE MURPHY PROJECT

Year	Number of Children by Age Elementary (5-12 Years)	Secondary (13-18 Years)	Total
1986	1	0	1
1987	5	3	8
1988	11	6	17
1989	26	16	42
1990	36	22	58
1991	42	26	68
1992	35	21	56
1993	23	15	38
1994	9	4	13

5.5.4 Police Protection, Legal, and Court Services

The RCMP detachments in Castlegar and Trail may experience changes in their workload as a result of the construction camps. There may be more traffic accidents or alcohol-related offences than without the project. Therefore, staffing patterns may have to be adjusted. For example, if construction proceeds on a 24-hour schedule, more officers may be required on duty in the late evening and early morning. In addition, if a significant number of transients come to the area seeking work on the project without being hired, crimes may increase. It is too early to accurately predict staff increases but, in the peak year, the camp and permanent residents would create a need for about one additional officer in the Trail area and part of an officer's time in the Castelgar area.

Permanent and camp residents would require some legal and court services which can probably be handled by existing services, providing additional court days can be scheduled.

5.5.5 Organized Recreation

The small number of permanent inmigrants can be expected to use the recreation services and facilities, but the existing capacity can meet this increased demand.

Camp residents would create a noticeable increase in the use of services in both Castlegar and Trail. It is important that additional services be provided so that access to recreation is maintined for permanent residents and so that the camp residents can productively use their leisure time.

An analysis of the service requirements that occurred at the Seven Mile and Revelstoke Canyon Projects would provide a realistic indication of what will be needed in Castlegar and Trail.

5.5.6 Community Planning

As noted throughout this report, there are many uncertainties regarding the socioeconomic impacts of a major project. Additional effort will be required by the Planning Offices in Castlegar and Trail to review the studies done by BC Hydro, to develop plans to deal with the impacts, and to closely monitor the actual effects of construction activities once they begin. This will place an additional burden on the planning staff.

5.6 Social Impacts

5.6.1 Introduction

Social impacts can be divided into two main categories:

(1) Direct social impacts are the effects of the project on social problems, local services, living conditions, way of life, and community cohesion. Some examples of these kinds of impacts include noise, dust, and traffic disruption from construction activities; the presence of transients in an otherwise stable community; increased demand for health, education, and social services; acquisition of homes; divided community opinion on a

new development; and an influx of construction workers causing an imbalance of males to females.

(2) Indirect social impacts are the cumulative effects of the environmental and economic impacts on how people feel about their community as a place to live. Some examples of these impacts are jobs, local income, increased cost of living, water pollution, loss of recreation, and loss of agricultural land. These project impacts can change what is often called the quality of life in an area.

In the remainder of this section we describe the public attitudes toward this project, identify likely social impacts, and provide an opinion as to the magnitude of these impacts.

5.6.2 Public Attitude

It is important to consider local residents' attitudes toward projects such as Keenleyside and Murphy when identifying the projects' potential social impacts because residents tend to be more tolerant of any project-related inconveniences or disruptions when they perceive a project to be beneficial to their community.

When residents of the study area were surveyed in the spring of 1981, 44% of those surveyed said they were against the Murphy Creek Project (without Keenleyside), 30% supported it, and 27% were neutral. At this time, higher reservoir elevations of 427 m or 430 m, which had greater impacts on properties, were still under consideration. Although opinion was mixed as to the overall benefits and losses of the Murphy Creek Project, some general conclusions could be drawn from the household survey. The most severe loss identified by residents was the loss of land and homes. Residents were also concerned about environmental impacts such as changes in the appearance of the area, bank erosion, and effects on the fishery, an important recreational resource. The most important social benefit perceived by residents was employment.

The attitudes of local residents toward the Keenleyside-Murphy Project were assessed through meetings with representatives of organizations in the Castlegar area who were identified by BC Hydro and local officials as having concerns about the project. These meetings and interviews were conducted in April, 1982. They indicated that many people in the local area considered Keenleyside and Murphy Creek to be two separate projects. In general, those people who viewed Keenleyside as a separate project were strongly in favour of it, while those who viewed Keenleyside and Murphy Creek as interdependent were ambivalent about the project.

The people who supported Keenleyside and wanted it to go ahead without Murphy did so because they thought the project would provide jobs and other economic benefits to the area. In addition, some of those who supported the project thought that it would not have any negative environmental impacts since the dam is already in place. In fact, many people felt that the installation of generating facilities at Keenleyside would provide a needed justification for the impacts which resulted from dam construction and reservoir flooding. The extent of public support for Keenleyside was such that the Castlegar Economic Development Committee and officials from the Municipality of Castlegar met with the Minister of Energy in April, 1982 to express the community's desire that the Keenleyside Powerplant Project be started without delay. The Committee presented the Minister with a petition in support of the project which had been signed by 2,683 people. The petition read as follows:

> "Castlegar Economic Development Committee urges your support in the matter of installation of hydroelectric capacity at the Hugh Keenleyside Dam. This petition is being presented to the Minister of Energy, the Honourable Robert McLelland with the intention of moving the start date up, and creating hundreds of badly needed jobs. This environmentally sound project wil be of benefit to all local citizens and the business community as a whole."

The only potentially negative socioeconomic impacts of Keenleyside alone that local residents identified were:

- a worsening of the traffic congestion on Columbia Street in Castlegar during project construction
- inconvenience for residents of Robson and Raspberry who would not be able to use the road across the dam during project construction[17] (project plans now provide for access)
- an increased strain on Castlegar's recreational facilities resulting from any significant population influx.

The attitudes of those who considered the Keenleyside Powerplant Project and the Murphy Creek Project as interdependent were less clear cut. Many people were ambivalent: they thought the area would benefit economically from the project, but they were concerned about the residents who would have to relocate and about the environmental impacts of the Murphy Creek dam. These concerns were also raised by people who were opposed to the project. The environmental concerns most often expressed were:

. Will the reservoir be suitable for use as a recreational lake or will the water level fluctuate so much and the water be so polluted that such use is unlikely?

. What will be the effect on the fishery?

. What will be the effect on the area's water supply?

Other concerns that were raised included:

. the possibility that boaters would be discouraged from using the reservoir because of the low clearance under the railway bridge at Castlegar and the lack of a lock at the Murphy Creek dam

. the possibility that public access to the reservoir would be inadequate

. the possibility that the river banks would be unstable

. the possibility that floating debris might be a problem.

It should be noted that many people in the local area expressed negative attitudes toward BC Hydro itself -- attitudes which are independent of the pros and cons of specific projects. Some people expressed frustration with Hydro's public information process. They thought the available information about Keenleyside Murphy was insufficient and they were suspicious that Hydro's information might be misleading. This distrust was reported to have its origin in previous experiences related to other hydroelectric development projects on the Columbia River. Some people felt strongly that BC Hydro should take more responsibility for mitigating impacts and providing compensation to local communities than they have done in the past.

In summary, many people view Keenleyside and Murphy Creek as two separate projects. These people want Keenleyside to proceed as quickly as possible so the community can obtain economic benefits. The people who view Keenleyside-Murphy as one project have a much more ambivalent attitude. They welcome the economic benefits from a major construction project, but they express serious reservations about the environmental impacts and the relocation of residents who live along the river banks.

5.6.3 Potential Social Impacts

The main social impacts of the Murphy Creek project were identified in the original 1981 study as resulting from the relocation of acquired households and construction disturbance at Rivervale/Oasis, near the project site. According to information received from BC Hydro in March, 1984, 200 households would be affected without toe protection and 136 households with toe protection (see Table 5-11).

The Murphy Creek study identified the concerns of residents who may have to relocate as being uncertainty about whether they would receive adequate compensation for their property, concern about direct moving costs or time lost from work for moving, and whether their new housing would be adequate. Potentially relocated residents were also concerned about the disruption and stress caused by moving from their neighbourhoods and the loss of valued homes and properties. Previous studies on relocation confirm that it is an extremely stressful experience for the relocated residents. Furthermore, if a significant proportion of the relocated residents move to another community, there could be important social changes in the community experiencing the populaton loss. This is a potential problem in Genella where 31% of the population would be relocated.

The residents of Genelle are justifiably concerned about the cumulative impacts of the project on their community. We present here a prelimnary assessment, but caution that additional work is required to obtain a complete picture.

1. Properties Related Impacts

The 1981 population of China Creek/Genelle was 970. If all housing units that have to be permanently relocated are moved from the community, it will lose about 30% of its population. The critical question, on which we have very little information, is: Where will the permanently relocated residents move?

The mobile home park has 94 pads and a permit for an additional 12 for a total of 106 pads. Currently (1984), 87 pads are occupied. Almost all the occupants work in the Trail area, and there are other trailer parks serving Castlegar. Studies by BC Hydro have identified suitable locations for a new park within Genelle or there is a small park in Genelle which could be expanded.

The only information we have on the occupants of the single family housing which would be flooded is from the 1981 houshold survey which included interviews of a sample of potentially relocated residents in Genelle. At that time, they preferred to relocate near where they now live.

A firm statement of the likely social impacts of the Murphy-Keenleyside Project cannot be made without more information on the relocated households and the location to which they will move. To obtain this information, we suggest that BC Hydro:

(a) Interview all potential relocated households (temporary and permanent) to inform them about their situation and find out household size, age of occupants, feelings about relocation, and preferred new location. This should be a joint effort between Properties, ESS, and Community Relations. There are obvious reasons for involving each of these groups. Properties is responsible for negotiations with property owners and any interviews must be compatible with their Acquisition Policy and strategy. ESS has the technical expertise to ensure that the survey is methodologically sound. Community Relations needs to be involved because they will have to deal with any issues arising from the interviews.

(b) Thoroughly investigate possible locations for a mobile home park and discuss the possibilities with the owner. By the time of project application, there should be a firm plan for relocation of the mobile home park, if the project is approved.

2. Municipal and Social Impacts

These impacts are directly related to the extent of population loss at Genelle. It is our understanding that Properties Division is assessing the impacts on the tax base. To complete this anlaysis, they will probably need information from the proposed household interviews on new locations for relocated residents.

The Genelle Elementary School has 46 pupils or 38.5 full-time equivalents with a staff of 2.5 teachers and a part-time custodian. Children are in Grades K-3; older students are bussed to Trail. Because the total enrollment is small, the viability of this school is assessed annually. Any decrease in the number of pupils would probably result in closure, with the possible exception of the Kindergarten. The people of Genelle and at the School District office do not want to close the school because they do not want to bus young children 30 minutes to the nearest school.

According to representatives at Canada Post, a population drop at Genelle would probably not result in closure of the local post office as long as the remaining residents continue to use it.

3. Municipal Infrastructure

Transportation information relevant to Genelle is taken from reports prepared by other consultants to BC Hydro and summarized below.

- Slope protection for the CP Rail Rossland Subdivision is required wherever the railway grade is downslope of the safeline. At Genelle, one area adjacent to the south side of the trailer park will require protection. Genelle residents should be given information on what is involved in slope protection. For example: How long will it take? Will there be noise from construction activities and truck traffic?

- There will be no highway relocation at Genelle. We have no information on whether highway relocation around the dam structures will disrupt traffic between Genelle and Trail. A section of local road immediately south of where China Creek meets the Columbia River will have to be reconstructed.

Other physical infrastructure changes at Genelle would be new sewage facilities and watermain reconstruction.

Another group of area residents who may experience negative social impacts as a result of the Murphy Creek Project are the approximately 400 residents of Rivervale and Oasis. These communities are close to the damsite and the site for the construction camp. They would be disturbed by noise, dust, and vibration caused by construction activity and may experience social disruptions related to the presence of the camp. Railway relocation, highway relocation, and transmission construction would also occur in the vicinity of Rivervale/Oasis.

The assessment of the impacts of construction noise and vibration which was done for BC Hydro[18] summarizes the impacts and possible mitigative measures as follows.

"The only vibration that would be experienced in Oasis and Rivervale would be that associated with blasting. However, it was concluded that neither vibration nor noise from blasting would have any serious impact on these communities providing that sequential delay blasting techniques are used to limit the explosive charge per delay to about 125 kg and providing that the number of blasts per day is small (i.e., 1 to 3) and blasts are scheduled to result in the least possible interference with community activities (particularly sleep).

"Construction noise, apart from blasting, would vary as the project progresses through various phases of construction. For the purpose of predicting noise impact, the major phases identified were Mobilization, Rock Excavation, Earth Excavation/Concrete, and Site Cleanup. If no mitigative measures are implemented, the noise impacts predicted at representative community locations would be as indicated.

"Limited possibilities are available to mitigate the predicted noise impacts. Noise produced by the predominant sources (rock drills and air compressors) could be limited by specifying that the contractor utilize some of the relatively quiet equipment which has become available over the past few years and in at least one case, truck noise could be reduced by a roadside barrier. It is assumed for the purpose of analysis that noise produced at night (i.e., between 22:00 hours and 07:00 hours) would be 10 dBA more significant in creating an adverse impact than noise produced during the day. Noise impact could also be reduced substantially by curtailing some of the noisiest activities during the nighttime hours and making up for this lost production by utilizing extra equipment during the daytime or by continuing a particular activity over a longer time period.

"Other available means of mitigating noise impact would involve noise control at the residences which are affected by the noise. Such measures as fresh air ventilation or air conditioning to alleviate the need for open windows and installation of storm windows and solid fences on the noise exposed sides of residences could be used in lieu of noise control on the site or in addition to noise control on the site."

The report concluded that these various possibilities for noise mitigation could reduce noise impact significantly. However, the noise impact at some locations in Rivervale/Oasis would be high even with the use of mitigative measures.

The site for the Murphy Creek construction camp was selected after six possible sites had been studied and after input from local residents had been received.[19] The selected site is adjacent to the damsite and Rivervale. While the presence of a construction camp near small communities such as Rivervale and Oasis could create social problems, two factors suggest that the Murphy Creek camp will not cause severe social disruption. These factors are:

- Since Rivervale and Oasis are almost exclusively residential, workers will go to Castlegar or Trail when they are not working.

- Local residents were able to review the site selection study results and express their preferences for the camp site. The results of this process and the lack of adverse reaction to the selection of the site adjacent to the damsite suggest that local residents do not foresee severe problems being associated with the camp.

A third group of area residents who may experience negative social impacts as a result of the Murphy Creek Project are those who will have to leave their residences temporarily to allow for alterations to their properties such as basement elevation or berming. Up to 47 households, most in the Castlegar and Robson areas, may have to relocate temporarily or have their household disrupted. Since we have no information on the length of time residents will be displaced or on BC Hydro's plans to compensate displaced residents, we cannot estimate the likelihood or magnitude of potential impacts on these residents.

Turning to the social impacts of the Keenleyside-Murphy project combined, the incremental social impacts of the Keenleyside Powerplant Project would be mainly positive, or beneficial, to the local people. This is atypical for a major development, but the reasons are as follows:

- the project would create much needed jobs and income for local residents

- the relatively small number of in-migrant workers and their dependents means that local services would not be overburdened
- there will be no new long-term environmental impacts resulting from the addition of generation facilities
- local attitudes to the Keenleyside project are positive
- since Castlegar is a highly stable, cohesive community, it is unlikely that the population influx resulting from the Keenleyside Powerplant Project would affect community cohesion or create social problems.

The only negative social impact which may result from the Keenleyside project would be the disturbance to the residents of the Balfour/Robson area who live close enough to the dam to be affected by noise, dust, and vibration associated with construction activity.

In conclusion, there are very few social impacts resulting from the Keenleyside Powerplant Project without the Murphy Creek Project, and the impacts are generally positive.

FOOTNOTES

1. Baron, J. Social and Economic Impact of the Seven Mile Hydroelectric Development on the Rossland-Genelle-Fruitvale Triangle. March, 1978.

2. BC Hydro & Power Authority. Revelstoke Labour Force Survey Report No. 1. September, 1979.
   Revelstoke Labour Force Survey (Draft) Report No. 2, 1980.
   Revelstoke Labour Force Survey (Draft) Report No. 3, 1980.

3. Ibid.

4. BC Hydro, Murphy Creek Project Residential Property Acquisition Report, Final Draft, Report No. H2457R, March, 1984.

5. All dollar values are in constant 1980 dollars.

6. MacKay, J. Economic Impact on the Rossland-Genelle-Fruitvale Triangle as a Result of the Seven Mile Project, Pend d'Oreille River Planning Department, Regional District of Kootenay Boundary, 1977.

7. MacKay, 1977. op. cit.

8. BC Hydro & Power Authority. Local Impact of the Site One Work Force on Public Services, Housing, and Consumer Spending, 1979.

9. BC Hydro & Power Authority, Revelstoke Labour Force Survey Report No. 1, 1979.

10. Statistics Canada Family Expenditure. Eight Cities. Canada, 1976.

11. MacKay, 1977. op. cit.

12. BC Hydro & Power Authority. Revelstoke Labour Force Survey Report No. 1, 1979. (Draft) Reports No. 1&2, 1980.

13. Thurber Consultants Ltd. Murphy Creek Hydroelectric Development Impact on Existing CP Rail Facilities. June, 1982.

14. Dayton and Knight Ltd. Report to the British Columbia Hydro and Power Authority on Murphy Creek Project Phase II Municipal Studies. May, 1982.

15. Ibid.

16. Pacific Hydrology Consultants Ltd. Murphy Creek Project Preliminary Design Groundwater Studies. August, 1982.

17. According to BC Hydro's Engineering Description for the Keenleyside project prepared in November, 1982, the road across the dam will remain open to traffic during project construction.

18. Harford, Kennedy, Wakefield Ltd. Murphy Creek Hydroelectric Project: Assessment of Noise and Vibration from Construction. November 15, 1982.

19. Bowman Engineering Associates Ltd. Murphy Creek Project Camp and Office Development Study Preliminary Design Report. September, 1982.

17. According to BC Hydro's Engineering Description for the Keenleyside project prepared in November, 1982, the road across the dam will remain open to traffic during project construction.

18. Harford, Kennedy, Wakefield Ltd. Murphy Creek Hydroelectric Project: Assessment of Noise and Vibration from Construction. November 15, 1982.

19. Bowman Engineering Associates Ltd. Murphy Creek Project Camp and Office Development Study Preliminary Design Report. September, 1982.

6.0 MITIGATION, COMPENSATION, AND ENHANCEMENT

The overall objective of mitigation, compensation and enhancement measures is that people living in the area should be as well off after the project as they were before the project. This is interpreted from a financial point of view and also in terms of quality of life. Obviously this objective is not always attainable, but every effort should be made to achieve it. If some local residents are to suffer losses so the province as a whole can benefit, then the province and the developer should compensate those persons for their losses.

Since the economic effects of the Keenleyside-Murphy Project would be beneficial to the study area, mitigation and compensation measures related to economic impacts are not required. However, BC Hydro could enhance the economic impacts by implementing the following measures.

Local Hire

At present, hiring of construction workers for BC Hydro projects is done through the construction trades unions. Many of these unions do not take the location of workers' permanent residences into account when matching workers with jobs. Thus, workers from outside the study area may get jobs on the project while local workers remain unemployed.

Because of the expected weakness in the study area economy, it is recommended that, within the constraints of present agreements between BC Hydro and the construction trades unions, preference in hiring should be given to residents of the study area. Information about available jobs should be distributed first in the study area. It is suggested that BC Hydro and the unions develop plans to maximize local employment on this project. In addition, BC Hydro should attempt, wherever possible, to hire its supervisory staff from the local area.

BC Hydro should also advertise that hiring is through the unions and not onsite. This will help reduce the number of transients who come to the area seeking work, thereby enhancing local hire and avoiding the social problems often created by transients.

Local Procurement

Since detailed information is not available concerning the goods and services to be required for the project, it is difficult to estimate the potential benefits to local businesses. BC Hydro should develop a program to make local businesses and suppliers aware of the requirements of the project and should develop measures to maximize the participation of local businesses in the project. For example, a contract which may be too large for a local firm to handle could be divided into smaller components. Such a program would be particularly beneficial in the procurement of the goods and services needed as a result of the alterations to residences which will be required (such as basement elevation and berming) and the temporary relocation of affected residents.

Liaison with Major Employers

In general, BC Hydro should discuss the labour requirements and timing of the Keenleyside-Murphy Project with the major employers in the area with the aim of coordinating their major labour demands to minimize economic and social disruption in the area.

The major social impacts of the Keenleyside-Murphy Project are identified in the previous section as the permanent relocation of people whose homes would be affected by the Murphy Creek Project and impacts on residents near the construction sites.

Compensation to Affected Residents

There are two main ways in which BC Hydro can assist potentially relocated residents: reducing their uncertainty during the pre-project approval phase and implementing a fair compensation plan for owners and renters.

Once a safeline has been established, BC Hydro can identify which buildings would definitely be affected. There are several issues such as bank stability, protective works, and seepage for which there may as yet be no definite answers. However, there should be a public information program to distribute information on reservoir effects known to date. This information should be property specific.

In 1981, some property owners believed that properties below the El. 430 m level had already decreased in market value and furthermore were slower to sell than properties not potentially affected. BC Hydro should address this concern by compiling data on selling prices and length of time on the market for different areas within Castlegar. Any changes in market value as a result of the Murphy Creek planning process would need to be included in compensation. On the other hand, if the Murphy Creek Project is not affecting house prices, owners need to be relieved of this concern. This information should be available in written form.

BC Hydro's policy for acquiring land in the area of the Murphy Creek project is described in Appendix E.

Liaison with Residents Living Near Construction Sites

BC Hydro should maintain close liaison with residents and groups in the Oasis and Rivervale area and the Balfour and Robson area to ensure that BC Hydro is aware of any serious problems related to the camps or disturbances resulting from construction activity. BC Hydro and the affected communities should work together to alleviate any problems which arise.

Compensation to Temporarily Relocated Households

BC Hydro should develop compensation plans for residents whose properties will be altered and who will, therefore, be temporarily displaced. The compensation plans will likely vary according to the nature of the alterations required, the length of time residents will be displaced, and the alternate accommodation arrangements preferred by different households These plans should be distributed with the information on relocation so residents can decide whether to relocate on a permanent or temporary basis.

We recommend an initial group meeting of all residents who would be temporarily relocated. This would provide an opportunity for BC Hydro to present the same information to everybody at the same time. This will help to control rumours about project impacts and compensation procedures that would only cause residents unnecessary anxiety. Following the group meeting, Properties should request a meeting with each individual household likely to be affected. This would allow residents to discuss their particular situation in the privacy of their own homes.

We recommend that BC Hydro does not make any land acquisitions or compensation agreements for temporary relocation until after the public hearing. It is our observation from Site C that this hurt as much as it helped the local residents. However, the above procedure for distributing information on relocation and compensation should be carried out in advance of the public hearings.

Information Regarding the Project's Environmental Impacts

As the previous section pointed out, many residents are concerned about the potential environmental impacts of the Murphy Creek Project. BC Hydro should make its consultants' reports on the environmental impacts of the Murphy Creek Project readily available to the public and should hold public information meetings in the local area to explain and/or clarify information about the potential impacts.

Project Monitoring

BC Hydro is in the process of developing a project monitoring system to assess the environmental, social, and economic effects of a project during construction and operation and to establish a mechanism for timely response to problems caused by the project. This system should monitor:

- the number of permanent inmigrants and their location because this will have implications for community services, especially schools and recreation
- project impacts on Rivervale and Oasis
- traffic congestion in Castlegar
- satisfaction of local residents with the land acquisition and moving compensation program
- population changes due to relocation and the resultant impacts on local government finance and access to services.

APPENDIX A

BIBLIOGRAPHY

APPENDIX A

BIBLIOGRAPHY FOR MURPHY CREEK STUDY

Blakely, R.V. Opportunity for Progress - A Special Relocation Policy for Gros Morne National Park. Department of Community and Social Development, Aylmer, Quebec, 1973.

Epec Consulting Western Limited. The Corporation of the City of Trail Official Community Plan. February, 1980.

Hartman, C.W. Relocation: Illusory Promises and No Relief. Virginia Law Review, Vol. 57, No. 5, 1971.

Kinnard, W.L. and Z.S. Malinowksi. The Impact of Dislocation from Urban Renewal Areas on Small Businesses. University of Connecticut, 1960.

Napier, T.L. and C.W. Moody. The Social Impact of Watershed Development: A Longitudinal Study. Water Resources Bulletin, Vol. 15, No., 3, June, 1979.

Pluves, M. and J.B.R. Whitney (Eds.). Environmental Impact Assessment in Canada: Processes and Approaches. Institute for Environmental Studies, University of Toronto, 1977.

US Government. Study of Compensation and Assistance for Persons Affected by Real Property Acquisition in Federal and Federally Assisted Programs. 88th Congress, 2nd Session, Washington, 1965.

BIBLIOGRAPHY FOR KEENLEYSIDE POWERPLANT STUDY

Bowles, Roy T. Social Impact Assessment in Small Communities, Butterworth and Co. (Canada) Ltd., Toronto, 1981.

Castlegar News. April 21, 1982.

Central Kootenay Regonal District, Arrow Lakes Regional Plan: Economic Study. Technical Paper No. 2, 1979.

City of Castlegar. City of Castlegar Profile. 1981.

Division of Health Services Research and Development, Health Sciences Centre, University of British Columbia. Roll Call 81, 1982.

DPA Consulting Limited. Murphy Creek Hydroelectric Development, Socioeconomic Impact Assessment, Final Draft Report, October, 1981.

Kerr Wood Leidal Associates Ltd. Murphy Creek Hydroelectric Project, Downstream Water Use Study. October, 1981.

Regional District of Central Kootenay. Castlegar Fringe Official Settlement Plan. 1982.

Revenue Canada. Taxation Statistics. 1981 edition (for 1979 tax year).

Tera Environmental Consultants Ltd. Preliminary Environmental Assessment Studies for Hugh Keenleyside Transmission. March, 1982.

Tera Environmental Consultants Ltd. Preliminary Environmental Assessment Studies for Murphy Creek Transmission. March, 1982.

Urban Systems Ltd. Murphy Creek Hydroelectric Development, Land Use Study, Final Draft Report, November, 1981.

Urban Systems Ltd., Keenleyside Power Project, Land Use Study, First Draft Report, May, 1982.

William Graham Consultants. City of Castlegar Official Community Plan. 1981.

APPENDIX B

TERMS OF REFERENCE

3 February 1982

KEENLEYSIDE POWER GENERATION

Terms of Reference
ENVIRONMENTAL STUDIES

1.0 INTRODUCTION

Prior to signing the Columbia Treaty in 1961 and its ratification in 1964, numerous studies were made of the hydroelectric development of the Columbia River in Canada. The Treaty between the United States and Canada led to the construction of Mica and Hugh Keenleyside projects on the Columbia River in Canada. The Revelstoke project on the Columbia, now under construction, is not a Treaty project.

Keenleyside dam was constructed at the outlet of Lower Arrow Lake near Castlegar, above the confluence of the Kootenay River. The project, completed in 1968, was for the purpose of water storage and contained no power generation facilities.

Since 1977, B.C. Hydro has been studying the Murphy Creek project, which would be located on the Columbia River, 35 km downstream of Keenleyside dam. Three reservoir elevations were studied; the lowest level (424 m) would allow the installation of a powerhouse at Keenleyside. The Murphy Creek project, if built, would not be a Treaty project.

Environmental information on the proposed Murphy Reservoir has been collected for levels 430 m, 427 m and 424 m. These terms of reference are for detailed environmental studies of the addition of Keenleyside power generation to the Murphy Creek 424 m case. All environmental studies should assume Murphy 424 m and identify any changes or incremental impacts caused by the Keenleyside project. All discussions should clearly specify the differences between the two scenarios.

The Keenleyside reports are intended to be read in conjunction with the Murphy Creek documents, and therefore should avoid duplication of baseline data wherever possible.

Information on the study area without further hydroelectric development, and on the impacts of Murphy 424 m, is available in existing Murphy Creek environmental reports.

Study objectives, organization, liaison and methodology are the same as described in the Murphy Creek terms of reference.

B.C. Hydro will supply information on project description and schedules, operating regime, and will make available environmental reports on Murphy Creek.

2.0 STUDY AREA

The study area consists of all lands and waters below 500 m elevation within 10 km of Keenleyside dam. The study area for fisheries should include the lower Arrow Reservoir and the future Murphy Creek Reservoir (or the Columbia River as far south as Trail). The study area for socio-economics and resource evaluation should include local communities of the Columbia Valley.

(a) Reporting Procedures

Written reports will be required for all sections of the studies. Five draft reports and 45 final reports will be required. Draft reports will be prepared and submitted for review by B.C. Hydro and, where necessary, by outside experts before they are accepted. All final reports shall be in a form suitable for release to government agencies and the public. Following completion of all the reports for the sections, B.C. Hydro will prepare an integrated summary report in consultation with the authors of the sections and outside experts, where necessary.

(b) Studies Schedule

The studies will be undertaken in early 1982. A target schedule showing specific deadlines will be issued for each section.

(c) Studies Sections

The following are guidelines for each of the sections. These guidelines distinguish between inventory and assessment work. Where feasible this distinction should be made in report preparation.

Study sections are:

A Aquatic Resources
B Vegetation, Agriculture and Forestry
C Wildlife
D Heritage Resources
E Socio-economic Resources
F Recreation
G Land Use
H Water Use
I Resource Atlas
J Resource Evaluation

APPENDIX C

STUDY CONTACTS

APPENDIX C

STUDY CONTACTS

1981

Castlegar Area

Len Embree, Alerman, Carpenter's Union Business Representative.

C. Cohoe, Alerman/Acting Mayor.

Castlegar City Council.

K. Malcolm, Tunnel & Rockworkers Union, Local 168 Nelson.

Paul Oglow, Private Citizen.

Don Belton, Maner, Labour Relations, Cancel.

Floyd Dykeman, Director, Regional Planning, CKRD.

Don Harasym, Regional Planner, CKRD.

Stephen Lauer, Industrial Development Commission, CKRD.

Jo Dascher, Supervisor, School District No. 9.

Ray Cattinger, Supervisor, Castlegar MHR.

Rod Irwin, Recreation Director, City of Castlegar.

Patricia Rogers, Probation Officer, Castlegar.

Staff Sgt. John Stevens, RCMP, Castlegar.

Igor Zahynacz, City Engineer, Castlegar.

Bill Krug, City Administrator, Castlegar.

Charlie Cohoe, Alerman.

Nancy Henne, Coordinator, Volunteers Exchange.

Ken Talarico, Hospital Administrator.

Jean Rae, Health Unit Supervisor.

Dan Fitger, Fire Chief.

John Holden, Superintendent, School District No. 9.

Office of Mr. Michelson, Manager, Castlegar Airport.

Mr. Turner, Attendant, Ambulance Services.

Trail Area

Tom and Jean McKenzie, Project Impact Committee.

Jim Switzer, Chairman, Project Impact Committee and Manager, Trail CEC.

Jim Grey, Director of Personnel, Cominco.

Ken Weisner, Municipal Administrator, Trail.

Jamie Forbes, Planner, City of Trail.

Audrey MacDonald, Treasurer, City of Trail.

Martin Kruyse, Industrial Development Commission, KBRD.

Curt Alberts, Director, KBRD.

W. Stahl, Probation Officer, Trail.

Staff Sgt. Huska, RCMP, Trail.

Mr. Enders, Administrator, Trail Hospital.

Brian Earthy, Supervisor, Trail MHR.

Mr. Lind, Superintendent, Trail School District.

Mr. Hatlevick, Administrator, Mater Misericordiae Hospital.

Lloyd Shimell, Ambulance Services.

Project Impact Committee.

Rivervale Community Association.

1982

Dan Fitger, Fire Chief, Castlegar.

Shirley Hunter-Oglow,Supervisor, Public Health Nursing, Castlegar Health Unit.

Sandra MacAndrew, Co-ordinator, Women in Need Society (WINS), Trail.

Audrey Moore, Mayor, Castlegar.

Igor Zahynacz, City Engineer, Municipality of Castlegar.

Larry Cruikshank, Administrator, Municipality of Castlegar.

Ken Talarico, Administrator, Castlegar Hospital.

Provincial Ambulance Service, Castlegar.

APPENDIX D

ECONOMIC AND DEMOGRAPHIC ANALYSIS: SUPPLEMENTARY NOTES ON METHODOLOGY

ECONOMIC AND DEMOGRAPHIC ANALYSIS: SUPPLEMENTARY NOTES ON METHODOLOGY

The purpose of this Appendix is to provide supplementary notes on the methodology used in assessing present socioeconomic conditions, and in preparing the without and with the project projections. In cases where methodology is discussed in the text, that discussion is not repeated here.

1.0 PRESENT SOCIOECONOMIC CONDITIONS AND WITHOUT THE PROJECT PROJECTIONS

Population was taken from the 1971, 1976, and 1981 Census. School District populations were prepared by the Central Statistics Bureau of the BC government.

Labour force activity for the study region (Regional Districts of Central Kootenay and Kootenay Boundary) were obtained from Statistics Canada. Data for the study area were prepared by Central Statistics Bureau based on School Districts #9 and #11.

Estimates of total personal income and personal income per capita for 1980 were prepared from a number of sources:
- income as reported in the 1971 Census for the study region and major centres in the study area;
- average wage and salary income and personal income based on tax return data reported by Revenue Canada;
- payroll estimates of major sectors indicated for 1980 in Tables 3-8 and 3-9 of the text.
- estimates of money income prepared by Statistics Canada for 1976-79.

The relationship of incomes in the study area and study region to the provincial average, as indicated by the Revenue Canada data, was adjusted downward to be consistent with income data from the 1971 Census. It was found that in 1971 the study region as a proportion of the provincial average was higher in the case of Revenue Canada data than in the case of income data from the Census. In other words, the technique involved applying the 1971-79 percentage changes in the ratio between the study region/area and the total province, to the similar ratios indicated from the 1971 Census income figures. The resulting estimates of total personal income were then compared for overall consistency with the payroll estimates in Tables 3-8 and 3-9.

Estimates of per capita money income before tax, available for the study region from 1976 to 1979, were used as a guide in preparing the estimates of personal income per capita. These are presented below. Unfortunately, corresponding data are not available for the study area.

Per Capita Money Income Before Tax*

	1976	1977	1978	1979
Total Province	6,729	7,341	7,986	9,098
Central Kootenay R.D.	5,581	6,081	6,714	7,471
% of Province	82.9	82.8	84.1	82.1
Kootenay Boundary	6,223	6,836	7,284	8,294
% of Province	92.5	93.1	91.2	91.2
West Kootenay Region	5,833	6,376	6,940	7,794
% of Province	86.7	86.9	86.9	85.7

*From Statistics Canada: Income Estimates for Sub-Provincial Areas 1976-79 (Cat. No. 13-5767)

The analysis of current conditions and future outlook of individual economic sectors was based on interviews with government officials, industry and labour union representatives, and local business people.[1] The information gained from these interviews was supplemented by information on regional, provincial, and national trends contained in a variety of documents. These documents included:

- Agriculture Statistics Yearbook: BC Ministry of Agriculture, 1978

- British Columbia Regional Index: BC Ministry of Economic Development, 1978
- Various Timber Supply Area Reports from the BC Ministry of Forests
- Economic Study: Arrow Lakes Regional Plan: Regional District of Central Kootenay, 1979
- BC Ministry of Energy, Mines and Petroleum Resources, Annual Reports, 1971-78
- Cominco Annual Reports, 1980 and 1981
- BC Research, British Columbia Tourism Model, 1979
- Toward A Community Plan for Rossland: Regional District of Kootenay Boundary, 1981
- Industrial and Commercial Expansion in BC, Ministry of Industry and Small Business Development
- Economic Review and Outlook: Ministry of Industry and Small Business Development, 1980 and 1981
- British Columbia Population Projections, 1979-2001, BC Research
- BC Business Bulletin, Ministry of Industry and Small Business Development, various issues
- Economic Outlook, Employers Council of British Columbia, 1980 and 1981
- Eighteenth Annual Review Economic Council of Canada, 1981
- Statistics Canada, various annual publications.

The information contained in these publications and secured from the interviews was reviewed and used selectively in preparing estimates of employment by industry for 1981 and industry employment projections through 2001. The factors considered for each industry are described in the text.

The employment by industry projections were used as the basis for projecting labour force and total population in the study area under the assumption that the Murphy Creek and Keenleyside projects do not proceed. The total labour force was estimated through projecting the unemployment rate. Projections of unemployment at the national level, provided by the 18th Annual Review of the Economic Council, were used as the starting point, but significant modifications were made to capture the effects of expected developments in the study area. The following compares the projections for the nation and those for the study area (in particular the labour demands of the area's major employers). The national projections after 1990 are based on the assumption that the long term trend forecasted by the Economic Council up to 1990 will continue through the projection period.

Unemployment Rate (%)

	Canada	Study Area	Study Area as % of Canada
1981	7.1	7.2	101
1986	5.5	13.0	236
1991	6.2	11.3	182
1996	5.6	9.6	171
2001	5.0	8.0	160

The most striking divergence between the country and study area is between 1981 and 1986. The increase in unemployment in the study area largely reflects the reduction in Cominco employment. After that, the gap between the country and the study area narrows in response to improvements in the study area's employment growth performance and adjustments in the labour market (reflecting, in part, out-migration from the study area).

The working age population (population aged 15 years and older) was derived through projecting the labour force participation rate. The national projections (based on Economic Council forecasts) and study area projections are as follows:

Participation Rate (%)

	Canada	Study Area	Study Area as % of Canada
1981	62.9	61.1	97.1
1986	65.9	62.3	94.5
1991	68.6	63.5	92.6
1996	70.1	64.7	92.3
2001	71.6	65.5	91.5

The study area rate is expected to increase at about one-half the pace projected for the total country. Relative to the country as a whole, people will be discouraged from joining the work force because of the slow employment growth in the study area. This particularly reflects the slow employment growth projected for the study area's service activities, the sector where women have traditionally found employment. Nearly all of the increase at the national level reflects increased labour force participation among women.

The total population was estimated through projecting the ratio of the working age population to total population. This information was taken from the most recent population projections by school district, produced by BC Research.

The number of private dwellings (or households) in the study area was projected through assuming that provincial trends in the number of people per dwelling (as indicated in Lands, Parks and Housing publications and other documents in recent years) would also be experienced in the study area. It was further assumed that differences among communities in the number of people per dwelling would stay constant through the projection period. The projections are as follows:

	Number of Persons/Private Dwelling				
	1981	1986	1991	1996	2001
Total Study Area	2.81	2.64	2.56	2.50	2.47
Trail	2.60	2.42	2.33	2.27	2.24
Castlegar	2.90	2.72	2.63	2.57	2.54
Rossland	2.80	2.62	2.53	2.47	2.44
Fruitvale	3.00	2.82	2.73	2.67	2.64
Montrose	3.20	3.02	2.93	2.87	2.84
Warfield	2.70	2.52	2.43	2.37	2.34
Rural (Trail) SD#11	3.10	2.92	2.83	2.77	2.74
Rural (Castlegar) SD#9	2.90	2.72	2.63	2.57	2.54

Anticipated Trends in the Provincial Economy: 1981-2001

Provincial and federal government documents were reviewed in order to identify expected growth trends in the British Columbia economy over the projection period. Provincial trends provide a useful reference point for the analyst and the reader in assessing expected economic developments in the study area. The following summarizes current thinking regarding growth in key economic indicators over the projection period. A range is provided, reflecting the uncertainty associated with any set of projections.

Provincial Indicators	Average Annual Increase: 1983-2001
Population	1.5-2.2%
Number of private dwellings	2.2-3.0%
Employment	2.0-2.7%
Gross Provincial Product & Personal Income (constant $)	3.5-4.0%
Productivity (GPP/Employee; constant $)	1.1-1.5%
Personal Income per capita	1.8-2.3%

Over the projection period, the major growth sectors in the province are anticipated to be mining, construction, tourism, finance, insurance and real estate, and other higher order services (especially those provided by the private sector). Non forest-related manufacturing shipments are expected to expand in line with gross provincial product, while more modest gains in employment and output are anticipated for agriculture, forestry, and public administration.

From 1984-1990, annual growth rates could be in the higher end of the range as the province recovers from the world recession of the early 1980s.

In providing comparisons between the study area and the province, personal income per capita in BC is projected to return to its 1980 level by 1986, and expand by 2.3% per annum from 1986 to 1991. After 1991, the projected rate of growth is 2.0% per year.

	Personal Income per Capita: Total Province $1980
1980	11,000
1986	11,000
1987	11,260
1988	11,520
1989	11,780
1990	12,040
1991	12,300
1992	12,560
1993	12,820
1994	13,080
1995	13,340
1996	13,600
2001	15,000

2.0 PREDICTIONS OF PROJECT IMPACTS

2.1 Labour Force Availability for Project Construction

The labour market area used for this analysis is defined as the summation of the Trail and Nelson Canada Employment Centres (CEC). In terms of population size, this area falls mid-way between the West Kootenay Region (the study region) and the Castlegar/Trail area (the study area). CEIC estimated the Nelson/Trail CEC's population to be 65,000 in 1980, compared with 1981 projections of 34,900 and 85,300 for the study area and study region respectively. However, while this labour market area is used as a reference point, it is postulated in estimating employment and income impacts that all current residents that will be employed at the Hydro project are residents of the study area. Otherwise, it would be necessary to estimate the number of workers who are residents of the labour market area, but not the study area. This would require information on worker commuting patterns and the distribution of unemployment within the study area which is not available.

In estimating the available labour supply by occupation for this labour market area and the study area, the following considerations were taken into account:

(1) The Labour Force Survey of Statistics Canada reported that the unemployment rate of Economic Region 92 (which approximates the Study Region) increased from an annual average of 8.2% in 1977 to 10.8% in 1981 and 16.6% in 1981. Over the period from 1977 to 1981, the provincial average moved downward from 8.5% to 6.7%, then more than doubled to 13.7% in 1983.

(2) The base case projections presented in Table 4-1 of the text suggest that the unemployment rate in the study area will remain above 10% at least until 1995. The labour market area, as defined above, will display a similar performance with respect to the rate of unemployment and related indicators.

(3) Over the 1980-82 period, the number of "unemployed" UIC claimants registered at the Nelson and Trail CEC's has increased markedly. The following provides three month averages for the "peak" and "trough" periods of unemployment during the year.

Unemployed UIC Claimants (Monthly Average)

	All Occupations	Construction Occupations	Union Hiring Halls
Jan-Mar 1980	2,399	621	266
Sep-Nov 1980	1,573	336	89
Jan-Mar 1981	2,317	561	377
Sep-Nov 1981	2,612	410	39
Jan-Mar 1982	4,052	873	284

This table suggests that the number of unemployed construction workers available to the BC Hydro project could range from about 425 to over 1,100 depending on the time of year and the point on the business cycle.

(4) Telephone interviews with the important labour unions confirmed very high unemployment rates among construction trades in the labour market area. To cite some examples from the April-May, 1982 period:

- the Operating Engineers reported 250 unemployed members from Cranbrook to the Alberta border
- unemployed carpenters in the Nelson and Trail areas totalled about 250
- unemployment among Tunnel and Rockworkers union membership is approaching the 200 level.

(5) A number of unions, including the Tunnel and Rockworkers, Carpenters, and IBEW, reported in 1981 that many of their members resident in the region were working in the Okanagan, Revelstoke, or East Kootenay areas. This situation complicates the calculation of population, employment, and income impacts. In order to simplify the analysis, it was assumed that people in this category who find work on the Hydro project would, in the absence of the project, move out of the study area before the start of construction. Our consultations suggest that a number of these workers have been staying in the study area waiting for the start-up of the Keenleyside Powerplant and Murphy Creek projects. It is reasonable to assume that, if the project were not to proceed and, in light of the lack of alternative construction projects in the area, many of these workers would relocate to be closer to their current and future work places.

(6) Unemployment within specific occupational categories is shown in Table D-2. These figures highlight the strongly seasonal nature of employment demands among construction and related trades, and confirm the sharp increase in unemployment in the study area from 1981 to 1982.

In evaluating labour force availability over the 1986 to 1995 construction period for the Keenleyside-Murphy project, the critical issue is the extent to which 1982 labour market

TABLE D-2: LABOUR FORCE SUPPLY IN THE STUDY REGION BY OCCUPATION[1]: APRIL 1981, SEPTEMBER 1981, AND APRIL 1982

Code No.[2]	Occupational Category	April 1981	Sept 1981	April 1982
2161	Surveyors	15	6	32
2163	Draughtsmen	3	10	12
2165	Architectural & Engineering Technologists & Technicians	7	7	8
411	Stenographic & Typing	80	85	104
6121	Chefs & Cooks	74	51	112
7713	Other Rock & Soil Drilling Occupations	20	15	38
7715	Blasting Occupations	2	-	3
831	Metal Machining Occupations	15	18	24
833	Metal Shaping & Forming	63	57	105
853	Fabricating, Assembling, Installing, & Repairing	6	7	13
871	Excavating, Grading, Paving, & Related	154	110	228
873	Electrical Power, Lighting & Wire Communications	66	28	70
8781	Carpenters & Related	211	103	319
8783	Concrete Finishing & Related	6	-	8
8791	Pipefitting, Plumbing, & Related	27	13	31
8793	Structural, Metal Erectors	19	8	19
8798	Labouring & Other Elemental Work	304	211	400
8799	Other Construction Trades	22	17	31
9175	Truck Drivers	132	101	212
	TOTAL: ALL CATEGORIES	1,226	847	1,769

[1] Based on regular active Unemployment Insurance claimants registered in the Nelson and Trail offices of the Canada Employment Commission.

[2] The Standard Occupational code used by Statistics Canada and other federal government departments.

conditions will continue through the projection period. The available information suggests that unemployment in the labour market area will average close to 15% of the work force through 1983, compared with about 7% in 1981. Our base case projections suggest that for most of the projection period, labour market conditions will be somewhere between the conditions that prevailed in 1981 and 1983. To be on the conservative side, greater weight has been given to 1981 over 1982 data in identifying labour supply by occupation.

Both labour union information and unemployment data were used in estimating the resident labour force by occupation that would be available to the project. These estimates are provided in Table D-3. When the unemployment by occupation data in Table D-2 were used, it was assumed that 75% of the labour force supply indicated for 1981 would

TABLE D-3: ESTIMATED RESIDENT LABOUR FORCE AVAILABLE TO KEENLEYSIDE-MURPHY PROJECT

Occupational Category	Number
Tunnel & Rockworkers	140
International Brotherhood of Electrical Workers	50
Carpenters	120
Machinists	70
Operating Engineers	100
Boilermakers	40
Office & Technical Employees	80
Culinary Workers	40
Teamsters	75
Cement Masons	5
Pipefitters	10
Iron Workers	10
Miscellaneous Trades	40
Supervisory	--
Owner's Staff	--
Total: All Occupations	780

be available for the Keenleyside and Murphy projects. This provides an allowance for frictional unemployment (people between jobs), residents of the labour market area who reside outside the study area, and the possibility that some of the people registered in these categories do not have sufficient skills to work on a hydro project.

With respect to seasonal considerations, a month of peak labour demands (September) is generally used in order to allow us to compare these figures with annual person-year requirements. It was assumed, therefore, that this is the number of people who would be available to work on the project throughout each of the years in the projection period.

Two final points should be noted regarding the labour availability figures in Table D-3:

- Availability in the miscellaneous trades is based on September, 1981 unemployment in "Other Construction Trades" and a small fraction of the unemployed in the labouring occupations (No. 8798).

- Supervisory and owner's staff positions will be held by permanent BC Hydro staff -- or permanent employees of construction contractors -- brought in from other parts of the province.

This analysis explicitly assumes that study area residents employed on the Hydro project will be drawn from the ranks of the unemployed. This assumption is necessary in order to estimate the "incremental" effects of the project on population, employment, etc. relative to the base case projections. In reality, many of the workers attracted to the BC Hydro project would be vacating positions they presently hold. They would be attracted away from these positions because of the higher wages and/or the greater number of weeks of employment per year offered by the Keenleyside

Powerplant with Murphy 424 project. It is postulated, however, that these vacated positions would be filled by unemployed workers. Through this "trickle down" effect, the project's incremental impacts on population, employment, etc. in the study area would be the same regardless of whether the BC Hydro employee would otherwise be unemployed.

In order to identify the number of jobs that would be filled by study area residents and the number that would be filled by in-migrant workers, labour force availability by occupation was compared with the annual person-year requirements for the Keenleyside-Murphy Project (see Table D-4). The division between the two categories is indicated for each year and occupation in Table D-5, under the assumption that positions would be filled by study area residents until the resident supply was exhausted. This assumption is consistent with the hiring practices of BC Hydro and most labour unions, as well as labour market conditions forecasted for different parts of the province during the 1986-95 period. Employment opportunities are expected to be much better in most other regions relative to the study area. Therefore, it will generally be much easier to recruit resident workers than to encourage workers residing in other regions to relocate to the study area.

It is also possible to complete this analysis under the assumption that either the Keenleyside or Murphy Creek project proceeds separately. The labour force requirements used in this analysis and the results of the analysis are presented in Tables D-6 through D-9.

The final step in this analysis is to include the work force requirements for transmission line construction. Based on information provided by BC Hydro, it was assumed that constructon of the Keenleyside Murphy transmission lines will require a work crew of 60 (maximum) for the following periods and activities:

TABLE D-4: KEENLEYSIDE-MURPHY PROJECT: ON SITE CONSTRUCTION LABOUR FORCE DISTRIBUTED BY CONSTRUCTION TRADE (Person-Years)

	1986/87*	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
Tunnel & Rockworkers	9	45	61	179	246	255	145	47	6
Internat'l Brotherhood of Electrical Workers	1	5	16	33	52	87	120	79	13
Carpenters	5	6	13	111	221	228	118	19	2
Machinists	-	-	-	-	24	86	108	59	6
Operating Engineers	8	47	61	140	129	128	92	43	5
Boilermakers	-	-	-	-	5	13	20	15	1
Office & Technical	5	18	43	93	138	151	118	63	13
Culinary Workers	1	6	4	30	44	51	42	18	2
Teamsters	3	20	24	66	78	81	58	29	6
Cement Masons	-	-	-	8	16	27	28	9	-
Pipefitters	1	2	8	15	33	47	54	35	6
Iron Workers	3	1	11	45	71	70	54	23	2
Misc. Trades	-	1	6	10	14	20	33	17	4
Supervisory	2	9	15	45	51	59	40	27	4
Owner's Staff	2	6	15	30	42	47	38	22	5
Total Person-Years**	40	166	277	805	1,164	1,350	1,068	505	75
Peak Requirements During the Year	150	250	450	990	1,470	1,600	1,340	800	200

* BC Hydro Fiscal Year is from April to March.

**Not including transmission line labour requirements.

Source: BC Hydro preliminary estimates provided December, 1982.

TABLE D-5: KEENLEYSIDE-MURPHY PROJECT: DISTRIBUTION OF CONSTRUCTION LABOUR FORCE BETWEEN RESIDENT AND IN-MIGRANT WORKERS

	Resident Labour Force Available	1986/87		1987/88		1988/89		1989/90		1990/91		1991/92		1992/93		1993/94		1994/95	
		R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I
Tunnel & Rockworkers	140	9	-	45	-	61	-	140	39	140	106	140	115	140	5	47	-	6	-
IBEW	50	1	-	5	-	16	-	33	-	50	2	50	37	50	70	50	29	13	-
Carpenters	120	5	-	6	-	13	-	111	-	120	101	120	108	118	-	19	-	2	-
Machinists	70	-	-	-	-	-	-	-	-	24	-	70	16	70	38	59	-	6	-
Operating Engineers	100	8	-	47	-	61	-	100	40	100	29	100	28	92	-	43	-	5	-
OTEU	80	5	-	18	-	43	-	80	13	80	58	80	71	80	38	63	-	13	-
Culinary Workers	40	1	-	6	-	4	-	30	-	40	4	40	11	40	2	18	-	2	-
Teamsters	75	3	-	20	-	24	-	66	-	75	3	75	6	58	-	29	-	6	-
Cement Masons	5	-	-	-	-	-	-	5	3	5	11	5	22	5	23	5	4	-	-
Pipefitters	10	1	-	2	-	8	-	10	5	10	23	10	37	10	44	10	25	6	-
Iron Workers	10	3	-	1	-	10	1	10	35	10	61	10	60	10	44	10	13	2	-
Boilermakers	40	-	-	-	-	-	-	-	-	5	-	13	-	20	-	15	-	1	-
Misc. Trades	40	-	-	1	9	6	15	10	-	14	-	20	-	33	-	17	-	4	-
Supervisory	-	-	2	-	6	-	15	-	45	-	51	-	59	-	40	-	27	-	4
Owner's Staff	-	-	2	-	-	-	-	-	30	-	42	-	47	-	38	-	22	-	5
Total*		36	4	151	15	246	31	595	210	673	491	733	617	726	342	385	120	66	9
Resident as % of Yearly Total		90%		91%		89%		74%		58%		54%		68%		76%		88%	

R = Resident Worker (Resident of the Study Area); I = In-migrant Worker.

* Excluding the transmission lines.

TABLE D-6: KEENLEYSIDE POWERPLANT PROJECT: ON SITE CONSTRUCTION LABOUR FORCE DISTRIBUTED BY CONSTRUCTION TRADE

	Person Years								
	1986/87*	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	Total
Tunnel & Rockworkers	9	42	26	101	72	51	24	5	330
IBEW	1	2	6	21	27	55	35	4	151
Carpenters	5	6	8	98	68	51	25	2	263
Machinists	-	-	-	-	9	46	32	2	89
Operating Engineers	8	46	24	55	44	23	11	5	216
Boilermakers	-	-	-	-	5	11	5	-	21
OTEU	5	18	14	49	51	48	24	4	213
Culinary Workers	1	6	4	18	16	16	9	1	71
Teamsters	3	19	9	29	21	18	10	3	112
Cement Masons	-	-	-	8	10	13	6	1	38
Pipefitters	1	2	3	9	14	21	13	1	64
Iron workers	3	1	6	29	26	20	12	1	99
Misc. Trades	-	1	1	4	7	8	5	2	27
Supervisory	2	8	6	24	17	17	9	1	85
Owner's Staff	2	5	5	15	17	17	8	2	71
Total Person Years**	40	156	112	460	404	415	228	35	1,850
Peak Requirements During the Year	150	200	200	540	490	500	340	130	

* BC Hydro Fiscal Year, from April to March.
**Not including transmission line labour requirements.

Source: BC Hydro preliminary estimates, provided December, 1982

TABLE D-7: KEENLEYSIDE POWERPLANT PROJECT: DISTRIBUTION OF CONSTRUCTION LABOUR FORCE BETWEEN RESIDENT AND IN-MIGRANT WORKERS

	Resident Labour Force Available	1986/87		1987/88		1988/89		1989/90		1990/91		1991/92		1992/93		1993/94	
		R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I
Tunnel & Rockworkers	140	9	-	42	-	26	-	101	-	72	-	51	-	24	-	5	-
IBEW	50	1	-	2	-	6	-	21	-	27	-	50	5	35		4	-
Carpenters	120	5	-	6	-	8	-	98	-	68	-	51	-	25	-	2	-
Machinists	70	-	-	-	-	-	-	-	-	9	-	46	-	32	-	2	-
Operating Engineers	100	8	-	46	-	24	-	55	-	44	-	23	-	11	-	5	-
OTEU	80	5	-	18	-	14	-	49	-	51	-	48	-	24	-	4	-
Culinary Workers	40	1	-	6	-	4	-	18	-	16	-	16	-	9	-	1	-
Teamsters	75	3	-	19	-	9	-	29	-	21	-	18	-	10	-	3	-
Cement Masons	5	-	-	-	-	-	-	5	3	5	5	5	8	5	1	1	-
Pipefitters	10	1	-	2	-	3	-	9	-	10	4	10	11	10	3	1	-
Iron Workers	10	3	-	1	-	6	-	10	19	10	16	10	10	10	2	2	-
Boilermakers	40	-	-	-	-	-	-	-	-	5	-	11	-	5	-	-	-
Misc. Trades	40	-	-	1	-	1	-	4	-	7	-	8	-	5	-	1	-
Supervisory	-	-	2	-	8	-	6	-	24	-	17	-	17	-	9	-	2
Owner's Staff	-	-	2	-	5	-	5	-	15	-	17	-	17	-	8	-	2
Total*		36	4	143	13	101	11	399	61	345	59	347	68	205	23	31	4
Residents as % of Yearly Total		90%		92%		90%		87%		85%		84%		90%		89%	

R = Resident Worker; I = In-migrant Worker.

*Not including transmission line labour requirements.

TABLE D-8: MURPHY CREEK PROJECT: ON SITE CONSTRUCTION LABOUR FORCE DISTRIBUTED BY CONSTRUCTION TRADE

	Person Years								
	Total	1987/88*	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
Tunnel & Rockworkers	663	3	35	78	174	204	121	42	6
IBEW	255	3	10	12	25	32	85	75	13
Carpenters	460	-	5	13	153	177	93	17	2
Machinists	194	-	-	-	15	40	76	57	6
Operating Engineers	437	1	37	85	85	105	81	38	5
Boilermakers	33	-	-	-	-	2	15	15	1
OTEU	429	-	29	44	87	103	94	59	13
Culinary Workers	127	-	-	12	28	35	33	17	2
Teamsters	253	1	15	37	57	63	48	26	6
Cement Masons	50	-	-	-	6	14	22	8	-
Pipefitters	137	-	5	6	19	26	41	34	6
Iron Workers	181	-	5	16	45	50	42	21	2
Misc. Trades	78	-	5	6	7	12	28	16	4
Supervisory	167	1	9	21	34	42	31	25	4
Owner's Staff	136	1	10	15	25	30	30	20	5
Total Person Years**	3,600	10	165	345	760	935	840	470	75
Peak Requirements During the Year		50	250	450	980	1,100	1,000	670	200

* BC Hydro Fiscal Year is from April to March.

**Not including transmission line labour requirements.

Source: BC Hydro preliminary estimates, provided December, 1982.

TABLE D-9: MURPHY CREEK PROJECT: DISTRIBUTION OF CONSTRUCTION LABOUR BETWEEN RESIDENT AND IN-MIGRANT WORKERS

	Resident Labour Force Available	1987/88		1988/89		1989/90		1990/91		1991/92		1992/93		1993/94		1994/95	
		R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I
Tunnel & Rockworkers	140	3	-	35	-	78	-	140	34	140	64	121	-	42	-	6	-
IBEW	50	3	-	10	-	12	-	25	-	32	-	50	35	50	25	13	-
Carpenters	120	-	-	5	-	13	-	120	33	120	57	93	-	17	-	2	-
Machinists	70	-	-	-	-	-	-	15	-	40	-	70	6	57	-	6	-
Operating Engineers	100	1	-	37	-	85	-	85	-	100	5	81	-	38	-	5	-
OTEU	80	-	-	29	-	44	-	80	7	80	23	80	14	59	-	13	-
Culinary Workers	40	-	-	-	-	12	-	28	-	35	-	33	-	17	-	2	-
Teamsters	75	1	-	15	-	37	-	57	-	63	-	48	-	26	-	6	-
Cement Masons	5	-	-	-	-	-	-	5	1	5	9	5	17	5	3	-	-
Pipefitters	10	-	-	5	-	6	-	10	9	10	16	10	31	10	24	6	-
Iron Workers	10	-	-	5	-	10	6	10	35	10	40	10	32	10	11	2	-
Boilermakers	40	-	-	-	-	-	-	-	-	2	-	15	-	15	-	1	-
Misc. Trades	40	-	-	5	-	6	-	7	-	12	-	28	-	16	-	4	-
Supervisory	-	-	1	-	9	-	21	-	34	-	42	-	31	-	25	-	4
Owner's Staff	-	-	1	-	10	-	15	-	25	-	30	-	30	-	20	-	5
Total*		8	2	146	19	303	42	582	178	649	286	644	196	362	108	66	9
Resident as % of Yearly Total		80%		88%		88%		77%		69%		77%		77%		88%	

R = Resident Worker; I = In-migrant Worker.

*Not including transmission line labour requirements.

Fiscal Year	Activity	Person-Year Equivalents
1989-1990	Logging	30
1990-1991	Clearing	30
1991-1992	Structure foundations, erection & stringing	55
1992-1993		10

It was also assumed that all of these workers would be brought in from outside the study area and would reside in construction camps established for the Keenleyside-Murphy Project. In estimating the in-migrant population, these figures were placed on a person-year equivalent basis and added to the in-migrant work force identified in the above tables.

2.2 Population Impacts

In translating the in-migrant work force estimates into population impacts, assumptions were made regarding the proportion of these workers who would bring their dependents with them and the number of dependents per family.

The first factor would depend on the age, income, and other characteristics of the in-migrant worker plus the worker's length of stay in the study area. Table D-5 indicates that a significant portion of the in-migrant workers fall into two categories: supervisory staff and owner's staff. These workers would tend to be older with larger families and would earn a good income. As well, the projections of occupational requirements suggest that most of these employees would have the opportunity of working on the project for a number of years. Therefore, we assumed that in each year, 75% of supervisor and owner staff would choose to live in permanent housing in the study area. In contrast, the in-migrant workers among the other categories would typically be needed for periods of one year or less. The longer-term positions would be filled by study area residents. It was assumed, therefore, that all these workers would reside in construction camps.

Table D-10 divides the in-migrant workers into permanent residents (i.e., a worker living in separate housing in the study area) and construction camp residents (including workers constructing the transmission lines). The three project alternatives described in the previous subsection are analysed separately. For Murphy Creek alone and Keenleyside alone the transmission line labour force is all attributed to Keenleyside.

TABLE D-10: DISTRIBUTION OF IN-MIGRANT WORKERS* BETWEEN PERMANENT RESIDENTS AND CAMP RESIDENTS

	Keenleyside Murphy		Murphy Creek Only		Keenleyside Only	
Year	P	C	P	C	P	C
1986/87	3	1	--	--	3	1
1987/88	11	4	2	0	10	3
1988/89	23	8	14	5	8	3
1989/90	56	184	27	15	29	62
1990/91	70	451	44	134	26	63
1991/92	80	592	54	232	26	97
1992/93	59	293	46	150	13	20
1993/94	37	83	34	74	3	1
1994/95	7	2	7	2	--	--

P = Permanent workers; C = Construction Camp Residents

* transmission line labour force is attributed to Keenleyside.

It should be noted that the construction camp figures represent the average number of workers living in camp over the course of a year. The peak number would be much higher, perhaps up to double.

At the Revelstoke construction site, workers who brought their families into the area averaged 2.05 dependents each. A household size of over three is above the base case projection for the study area, but is consistent with the age and income characteristics of the typical workers likely to migrate into the area. Therefore, a family size of 3.05 was used to compute the population impacts described in Table D-11. As well, these impacts are placed on a calendar year basis by (for example) taking three-quarters of the 1986-87 figure and applying the result to 1986; the remainder is applied to 1987.

TABLE D-11: POPULATION IMPACTS OF PROJECT ALTERNATIVES*

	Keenleyside-Murphy			Murphy Only			Keenleyside Only		
	P	C	T	P	C	T	P	C	T
1986	6	1	7	--	--	--	6	1	7
1987	27	3	30	6	0	6	27	2	29
1988	61	7	68	34	4	38	24	3	27
1989	146	140	286	70	24	94	73	36	109
1990	204	384	588	122	119	241	82	48	130
1991	235	557	792	159	232	391	79	65	144
1992	195	368	563	146	181	327	49	28	77
1993	131	135	266	113	95	208	15	5	20
1994	43	23	66	40	20	60	3	0	3
1995	6	0	6	6	0	6	--	--	--

* Average impact for the year in question.

2.3 Supplier Related Income Impacts

The supplier related effects of a project on a local economy are best determined through comparing the non-wage expenditures of the project, on an item-by-item basis, with the supply capability of the local economy. Unfortunately, the non-wage expenditures by category of the Keenleyside-Murphy Project have not been determined. Therefore, it was necessary to prepare a rough order of magnitude estimate of local spending on supplies and services as follows:

(1) the latest capital cost estimates for the two projects

were divided by the factor 1.25 in order to convert to 1980 dollars; the latest estimates, prepared in the fall of 1982, indicate that the Murphy Creek costs will be $645.7 million and the Keenleyside Powerplant capital costs will be $301.2 million; in terms of 1980 dollars, the capital costs of the two projects combined come to $757.5 million;

(2) the ratio of local spending to capital costs experienced at Seven Mile project was applied to total capital costs for the two projects combined;

(3) the resulting total figure for local spending was distributed over the project period based on the annual distribution of employment, and wages and salaries;

(4) consistent with estimates for the Seven Mile project, one-third of the total purchases is estimated to provide local value added.

2.4 Calculation of Induced Income

The induced income effect has been derived from a regional economic model developed by Davis[2]. This model was applied to the Seven Mile Project in 1977[3] and has been updated for Murphy Creek based on anticipated changes in the study area economy over the 1977-1980 period. The multiplier is expressed in the form:

$$K = \frac{1}{1-c(1-t_n-t_l)(1-m_c)-(t_l(1-t_n-t_l)(1-m_g)}$$

where: K = induced income multiplier

c = marginal propensity to consume out of disposable income

t_n = marginal rate of non-local taxation

t_l = marginal rate of local taxation

m_c = marginal propensity to import consumer goods and services

m_g = marginal propensity of local government to import.

The values of these parameters for the Castlegar/Trail area have been estimated as follows:

$c = 85.96\%$
$t_n = 25.3\ \%$
$t_1 = 2.7\ \%$
$m_c = 66.3\ \%$
$m_g = 27.0\ \%$.

Compared to MacKay's 1977 report, the value of c has been reduced to reflect an increased rate of saving;[4] t_n has been increased to reflect the relatively high family income and corresponding marginal tax rate in the area;[5] t_1 has been reduced to reflect the average level of property taxes relative to income in the area as given above; m_c has been reduced due to the addition of housing to the list of expenditure items cited by MacKay. Although four of the parameters have been altered, the changes are offsetting. The revised multiplier is 1.287, almost identical to the value of 1.283 previously derived.

Calculation of Indirect Employment

Indirect employment was computed by applying value added per employee figures, based on provincial averages for the industries concerned, to local value added. In the case of project supplies and services, an average of the manufacturing and wholesale industries was applied, and for residential construction, value added per employee in the construction industry was used. The figures employed are as follows:

	Value Added Per Employee	
	For Project Supplies & Services	For Project Residential Consruction
1986	29,000	36,400
1987	29,300	36,800
1988	29,600	37,100
1989	29,900	37,500
1990	30,200	37,900
1991	30,500	38,300
1992	30,800	38,700
1993	31,100	39,100
1994	31,400	39,500
1995	31,700	39,900
1996	32,000	40,300

The year-to-year changes reflect increases in real wages (largely the result of anticpated productivity improvements) of 1.0% per year.

Calculation of Induced Employment

Induced employment created as a result of project construction was estimated from induced income, using the following equation:

$$E_i = \frac{I \times p}{w} \times 0.5$$

where: E_i = number of induced person-years of employment
I = amount of induced income ($1980)
p = proportion of local value added generated as wages and salaries
w = average wage in the local service or residentiary sector ($1980)

The proportion of local value added generated as wages and salaries was estimated to be 80%. Wages and salaries in the residentiary service sector in the study area were estimated as follows:

1986 - 19,900
1987 - 20,100
1988 - 20,300
1989 - 20,500
1990 - 20,800
1991 - 21,000
1992 - 21,300
1993 - 21,600
1994 - 21,800
1995 - 22,100

The year-to-year changes reflect increases in real wages of 1.2% per annum.

The factor of 0.5 in the equation is based on the following considerations. It can be argued that because of the temporary nature of construction impacts, this formula without adjustment would tend to overstate the additional employment resulting from respending effects. Rather than adding staff, employers may tend to increase sales per employee or may transfer staff from part to full time status. This assumes that without the project there would be a fair degree of slack in the study area's service sectors. (This is consistent with economic conditions projected for the study area without the project.) To account for this, the induced employment has been reduced by applying a factor of 0.5 to the first ratio in the equation.

Income and Employment Impacts: Other Assumptions

In addition to the above multipliers and equations and the assumptions noted in the text, the following assumptions were used to compute the figures in Tables 5-14 and 5-16:

- It was assumed that the average wage was the same for all categories of workers (permanent residents and camp residents)

- The "Increase in Income Available for Local Spending" is the portion of total wages and salaries that is "relevant to" the local economy. Therefore, these figures include savings and non-local taxation. The effects of these two variables are removed through the operation of the induced income multiplier.

- Personal income relates to the income accruing to permanent residents[6] of the study area -- including in-migrant workers and current residents -- and includes the construction wages paid to area residents plus the indirect and induced incomes accruing to residents, minus the transfer income foregone as a consequence of finding employment as a result of the direct, indirect, or induced impacts of the project. Transfer income foregone -- composed of unemployment insurance and/or social assistance payments to unemployed workers -- is assumed to be $5,000 per person per year. The effects of transfer income foregone is also removed when computing the increase in wage income available for local spending. The detailed computations for the "Increase in Income Available for Local Spending" and the Increase in Personal Income are displayed in Tables D-12 and D-13.

- Personal income per capita was computed using the permanent population of the study area as the denominator. These figures therefore differ from the population impacts in Table 5-6 which include the temporary residents living in construction camps. The permanent population of the study area with the project is estimated as follows:

  1986 - 33,506
  1987 - 33,427
  1988 - 33,361
  1989 - 33,346
  1990 - 33,304
  1991 - 33,235
  1992 - 33,195
  1993 - 33,131
  1994 - 33,043
  1995 - 33,006

- The employment impacts described in Table 5-16 relate to the employment provided to permanent residents of the study area (both current residents and in-migrant workers who take up permanent residence). The unemployment impacts result from the jobs provided to

TABLE D-12: INCREASE IN INCOME AVAILABLE FOR LOCAL SPENDING: DETAILED CALCULATION BY YEAR

($1980 thousands)

	Permanent		Camp	From Local Value Added		Gross Impact	Deduct Effect of Reduced Transfers*	Net Effect
	Current	In-mig.		Project Supplies	Con-struc.			
1986-87	897	75	4	18	--	994	139	855
1987-88	3,760	274	17	76	--	4,127	578	3,549
1988-89	6,125	573	33	127	124	6,982	960	6,022
1989-90	14,816	1,394	764	382	124	17,480	2,310	15,170
1990-91	16,758	1,743	1,872	546	--	20,919	2,614	18,305
1991-92	18,253	1,992	2,457	643	--	23,345	2,854	20,491
1992-93	18,077	1,470	1,216	493	--	21,256	2,801	18,455
1993-94	9,587	921	345	231	--	11,084	1,481	9,603
1994-95	1,643	174	8	35	--	1,860	251	1,609
Total	89,914	8,615	6,715	2,550	248	108,042	13,988	94,059

*These deductions relate to the local spending of current residents who would be unemployed without the project. The figures in this column are equal to the number of current residents who find work as a result of the project (both direct and indirect effects) x $5000 x .75 (the proportion of transfer income that is "relevant" to the local economy). Based on Table 5-15, the number of workers in this category are:

1986/87 - 37	1989/90 - 616	1992/93 - 747
1987/88 - 154	1990/91 - 697	1993/94 - 395
1988/89 - 256	1991/92 - 761	1994/95 - 67
		Total - 3,730

N.B. Columns may not add to totals due to rounding.

TABLE D-13: INCREASE IN PERSONAL INCOME ACCRUING TO PERMANENT RESIDENTS OF THE STUDY AREA

($1980 thousands)

	Wages to Permanent Residents	Total Value Added from Indirect Effect	Induced Incomes	Gross Impact	Deduct Reduced Transfer Payments*	Net Effect
1986/87	1,295	24	245	1,564	210	1,354
1987/88	5,378	101	1,019	6,498	870	5,628
1988/89	8,931	334	1,728	10,993	1,450	9,543
1989/90	21,613	674	4,354	26,641	3,505	23,136
1990/91	24,668	728	5,254	30,650	3,990	26,660
1991/92	26,993	857	5,881	33,731	4,360	29,371
1992/93	26,062	657	5,297	32,016	4,230	27,786
1993/94	14,010	308	2,756	17,074	2,230	14,844
1994/95	2,423	46	462	2,931	375	2,556
Total	131,371	3,730	26,995	162,098	21,220	140,878

*These deductions relate to the transfer income that would have accurredto local residents in the absence of the project. The figures in the colum are equal to the number of current residents who find work as a result of the project (direct, indirect and induced effects) times $5000. Based on Table 5-15, the number of workers are as follows:

1986/87 - 42
1988/89 - 174
1989/90 - 290
1989/90 - 701
1990/91 - 798
1991/92 - 872
1992/93 - 846
1993/94 - 446
1994/95 - 75
Total - 4,244

current residents as a direct or indirect consequence of the project; (the in-migrant workers would not be residing in the study area in the absence of the project.)

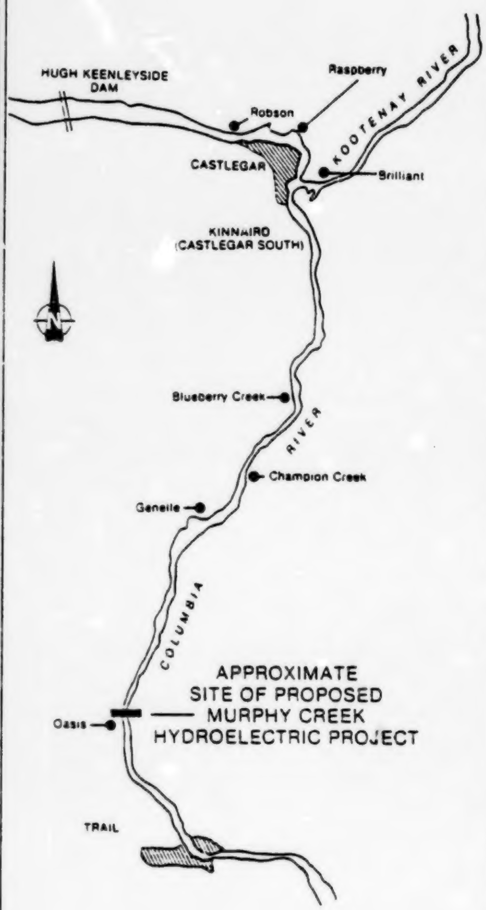
FOOTNOTES

1. Most of these interviews were conducted while preparing the Murphy Creek Socioeconomic Impact Study, but updates were conducted as part of this work program on a selective basis.
2. Davis, H.C. Assessing the Impact of a New Firm on a Small Scale Regional Economy. Plan Canada 16/3,4, 1976.
3. MacKay, 1977. op. cit.
4. Statistics Canada Catalogue No. 13-213. Provincial Economic Accounts Experimental Data. 1964-1979.
5. Statistics Canada Catalogue No. 62-547. Table 1 Summary of Family Expenditure by Family Income, 1976.
6. It is assumed, therefore, that the construction camp workers are permanent residents of communities outside the study area. Therefore, their incomes would be reported as part of the total personal income of another region.

APPENDIX E

BC HYDRO, MURPHY CREEK LAND ACQUISITION POLICY

AREA MAP OF PROPOSED MURPHY CREEK PROJECT


HUGH KEENLEYSIDE DAM
Raspberry
Robson
KOOTENAY RIVER
CASTLEGAR
Brilliant
KINNAIRD (CASTLEGAR SOUTH)
N
Blueberry Creek
RIVER
Champion Creek
Genelle
COLUMBIA
APPROXIMATE SITE OF PROPOSED MURPHY CREEK HYDROELECTRIC PROJECT
Oasis
TRAIL

B.C. HYDRO

Murphy Creek

Land acquisition policy

B.C. HYDRO

OCTOBER 1980

Introduction

While it is generally desirable to avoid the acquisition or use of privately-owned land to accommodate B.C. Hydro facilities, this cannot totally be avoided. Whatever land ultimately is required, we try to develop our facilities with proper consideration for social and environmental concerns, for the best use of land and within the technical and economic constraints involved.

At present, Hydro is investigating a possible hydroelectric development at Murphy Creek, on the Columbia River about 3 km upstream from Trail and 25 km downstream from Castlegar. Engineering and environmental studies are in progress.

Until and unless the project is approved, Hydro has no authority to carry it out. Indeed, until the studies are completed and the results known, we do not know whether we will seek such authority. Consequently, we are not at this time actively seeking to acquire land for it.

However, to alleviate uncertainty among people who own property which might be affected if the Murphy Creek project does go ahead, we believe it is appropriate to make a formal statement of the policy we would follow with respect to compensation for, and relocation of, people who would be directly affected. This brochure outlines that policy.

If you have any questions after reading this brochure, please write or telephone D.R. Jenkins, Senior Land Supervisor, Acquisition and Appraisal Department, Properties Division, B.C. Hydro, 900 - 1045 Howe Street, Vancouver, B.C. V6Z 2B1, telephone 663-2437. Please indicate when telephoning or writing that the inquiry relates to Murphy Creek.

Murphy Creek Land Acquisition Policy

Acquisition Program Implementation

B.C. Hydro will not seek to implement any program of property acquisition unless and until the necessary hearing process and licensing procedure has been followed and a project authorized.

Authorized Project Acquisition Program

If the project were authorized, the main features of an acquisition program would be:

i) Review and list all properties and owners affected.

ii) Contact each owner to explain the program and listen to his or her concerns.

iii) Conduct a professional appraisal of each property.

iv) Make an offer based on appraisal and founded on the principles of compensation outlined below.

v) Discuss with each owner all matters arising out of the offer and appraisal with a view to reaching a mutually acceptable agreement.

Agreement to Purchase

Disruption of an owner's life is a serious matter. The experience of the adversary procedure of expropriation does nothing to improve it. This method is resorted to only when all other reasonable attempts to achieve a settlement have failed.

In the majority of cases, where land is acquired by agreement, it is Hydro's policy to base the price on market value. Experience indicates that in most cases agreement can be reached upon the market value of land without a great deal of difficulty provided valuations are realistic and the parties are negotiating in good faith. Compensation for disturbance and similar items can be more difficult. To ensure that cases involving expropriation are avoided or kept to a minimum, the following principles will apply.

i) All offers will be based upon a professional appraisal.

ii) The basis of each offer and appraisal will be fully discussed with the owner.

iii) Each offer will reflect consideration of all compensable aspects of value; Hydro will not offer low and bargain up. It will be open to an owner to raise other compensable items.

iv) Disturbance payments, where appropriate, will be determined after discussion with each owner.

v) Consistency will be sought by use of professional appraisals and rigorous internal scrutiny.

vi) Hydro will not discuss any owner's case with any other owner.

Principles of Compensation

The legal basis of compensation for land is laid down in the legislation and case law applicable at the time of acquisition.

Market value is the basis of compensation. This has been defined in law as "... the amount which the land, if sold in the open market, ... might be expected to realize." However, it is the value to the owner at the time of taking which provides for compensation for losses over and above base market value, subject to proof of such losses.

The value to the owner standard has been interpreted by the Supreme Court of Canada as meaning that "... the owner at the moment of expropriation is to be deemed as without title, but all else remaining the same, and the question is what would he, as a prudent man, at that moment, pay for the property rather than be ejected from it." "Special Value" to the owner, if any, has been recognized as a constituent element of the value to the owner standard which can only arise when the owner is actually putting the property to some use for which it is especially well-suited.

"Special value" describes some attribute of the property which is of economic value to the owner but which would not enhance the market value of the property. The most usual example of special value is the use of land for a business which cannot be carried on to equal advantage on another site, or at all. Another instance is the case of a paraplegic or otherwise handicapped person who may have made structural alterations to his residence, such as ramps and lowered kitchen counters, to accommodate his disability.

An additional compensable item may be disturbance damages: compensation for the economic loss which would be suffered by an owner by reason of having to move from the taken property.

The first task where relocation is necessary is to make contact with the people affected, verify the general nature of relocation aspects and establish in detail what is required in each case. This would include a study not merely of financial requirements but also, in certain cases, requirements for help in finding other accommodation or in determining what to do.

The objective of this study would be to arrive at a program which would assure owners of a level of compensation adequate to enable them to retain a standard similar to that which they currently enjoy and to assist them in their decision making process, should they so wish.

Where only part of the owner's property is taken, or in very limited circumstances where no land at all is taken, injurious affection may be claimed. These damages refer to the loss, if any, sustained by the owner arising out of the severance of a portion of the land from his property.

APPENDIX F

SAMPLING METHODS

APPENDIX F
SAMPLING METHOD

Study Population

At the time the survey was planned, 1981 Census data were not yet available. Therefore, the number of households in communities that could be affected by the Murphy Creek Project was estimated from 1971 and 1976 Census data on population and household size.

TABLE F-1: NUMBER OF HOUSEHOLDS IN COMMUNITIES POTENTIALLY AFFECTED BY THE MURPHY CREEK PROJECT

	1981 Population Estimate	1981 Household Size Estimate	1981 No. of Households Estimate
Castlegar	6,720	2.9	2,300
Robson	1,120	2.8	400
Raspberry	110	3.0	37
Brilliant/Ootischenia	710	2.9	245
Blueberry/Fairview	950	3.2	300
Genelle	920	3.2	300
Oasis/Fruitvale	440	3.0	146
Trail	9,340	2.5	3,810
Total			7,538

The number of households potentially relocated was estimated to be about 500, depending on the reservoir elevation level selected and the type of protective works. The potentially relocated households were located in Castlegar, Robson, Raspberry, Brilliant/Ootischenia, Blueberry/Fairview, and Genelle.

Study Sample

The study population was stratified into two subgroups:

I Potentiall Relocated -- Households that might be directly affected by the reservoir

II Not Relocated -- Households in communities that might be affected by the project, but would not be directly affected by the reservoir.

Residents' attitudes toward the project were expected to differ, depending on whether their homes would be directly affected. Consequently, stratifying individuals into the two subgroups, and taking a random sample within each subgroup or strata would yield efficiency gains relative to taking a random sample from the total population.

If one were interested only in the total population in the study area, one would have an equal sampling fraction for each strata, e.g., take 5% sample in each strata. However, since we were interested in separate information for the group potentially relocated and since this groups comprises an estmated 500 households out of the total population of 7,500 households, one has to take a relatively larger sample from this "directly affected" group to meet desired precision targets.

The key questions in the survey are categorical questions with the respondent choosing from among 2-5 possible answers. Consequently, the answer to each question is a multinomial variate (in the case of three or more possible answers) or a binomial variate (in the case of two possible answers). In the following table, we outline certain precision/sample size trade-offs at a 90% confidence level where P is the proportion of respondents choosing (or not choosing) a particular category (choosing "yes" or "no" in the binomial case) and d is the asolute precision target.

d^P	Minimum Sample Size .1	.2	.3	.4	.5
.005	81	129	156	171	176
.075	40	67	84	94	97
.100	23	40	51	58	60

The above table refers to the case of a total population of 500.[1]

A sample size of 100 is recommended from the group of 500 directly affected households (although one might "live with" a sample of 75). After constructing a table similar to the above for the gorup of households living in the communities affected by the project, but not directly affected themselves, one would require a somewhat larger sample for this group than that indicated for the group of 500. However, because this group of 7,000 households is not of as much interest, one would recommend a sample size of 180 drawn from this group.

To sum, the recommended sample sizes are:

	No. of Households	**Sample Size**	**Sampling Fraction**
Households Directly Affected	500	100	.20
Remaining Households in Affected Community	7,000	180	.03

Sample Selection

Potentially Relocated . In Castlegar, the phone book was used to identify each residence whose address indicated it was potentially relocated. In the remaining communities a map was used to identify potentially relocated residences. A random sample of 125 residences was then selected. From this sample, we obtained 105 completed interviews, or a response rate of 84%.

Not Relocated. The phone book was used to select the sample for the communities with listed street addresses. Maps were used for the remainder of the communities. A sample of 180 was drawn which resulted in 150 completed interviews for a response rate of 83%.

Of the 50 people in the sample who were not interviewed, 8 could not be contacted and 42 refused to be interviewed. The most frequently stated reason for refusal was "not interested" (38 people); 2 people stated the dam would go ahead anyway; 1 person said it would have no effect on their household; and 1 person knew nothing about the project.

FOOTNOTES

1. $n = \frac{No}{1 + no/N}$

   where $no = (f^2 PC)/d^2 = (1.645)^2 \frac{P(1-P)}{d^2}$

   and $N = 500$.

   See W.G. Cochran Sampling Techniques, John Wiley and Sons, New York, 1963, p. 75.

POOR

QUALITY

ORIGINAL